

# **Full Circle**

## **A Treatise on Roller Locking**

**by R Blake Stevens**

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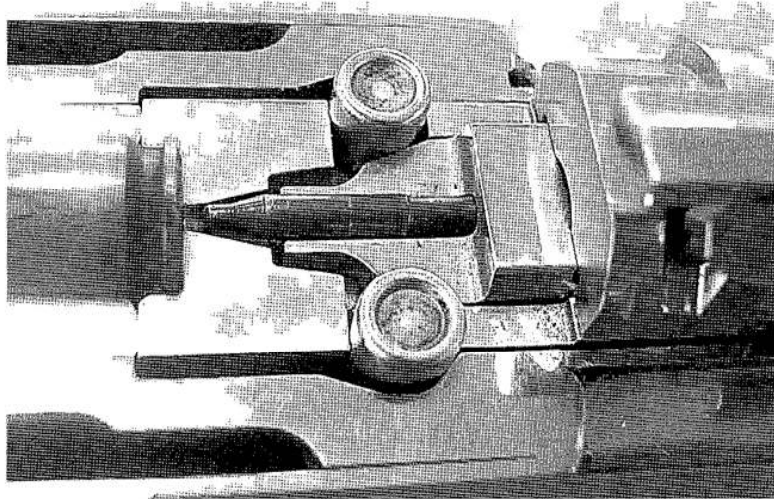


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## Introduction

# Setting the Stage



1. A top left cutaway view of a G3 rifle action, showing details of the locking system.

The bolt head surrounds the base of the chambered cartridge case, left, and the two locking rollers are shown resting in recesses in the barrel extension, whence they are urged by the angles on the central *Steuerstück* or steering piece, which is coupled to the bolt carrier.

On firing, the cartridge case becomes a piston, pushing back on the bolt head and eventually forcing the rollers to cam the *Steuerstück* rearward far enough to allow the rollers to withdraw completely within the bolt recesses, to effect unlocking.

During this phase the motion of the bolt head, compared to that of the bolt carrier, is in the ratio of 1 : 4. courtesy Wolf Riess

**T**his book is concerned with a specific and very ingenious firearm action mechanism called *halbstarr verriegelten Rollenverschluss* (the “half-locked roller system”), which interestingly enough

was developed, seemingly spontaneously and yet with virtually identical characteristics, by two different German companies during the latter years of World War II.

## Fully-Locked Forerunners

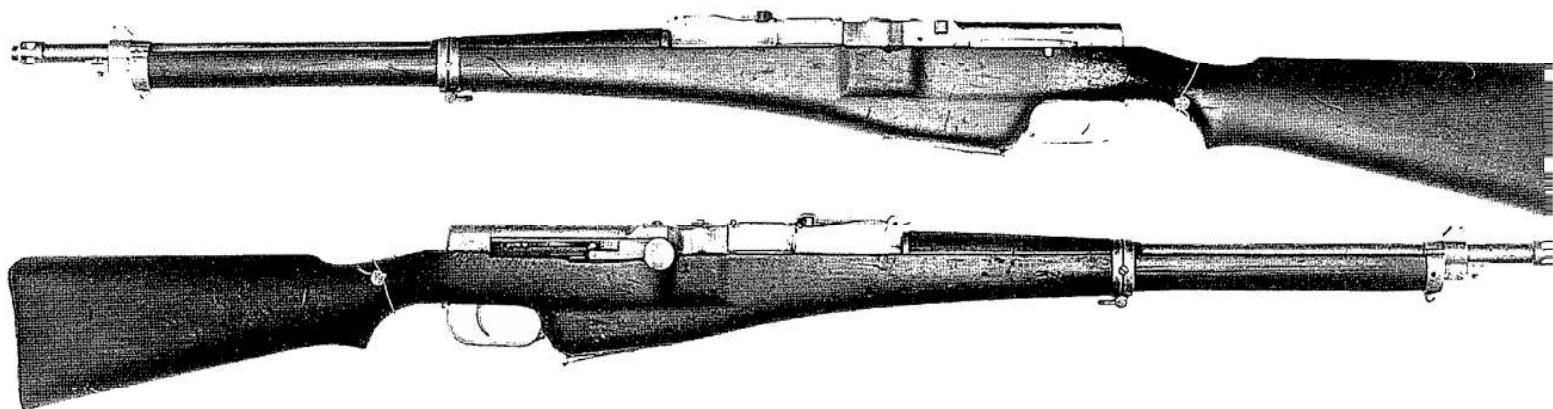
### The Hunneshagen Rifle

Several interesting antecedents to these wartime developments have been documented. In his 2004 Collector Grade title *Sturmgewehr!*, historian and researcher Hans-Dieter Handrich discusses the Hunneshagen rifle, first developed for the IWG (*Inspektion für Waffen und Gerät der Reichswehr*) in 1924.

This self-loading rifle is described as follows:

... gas operated with a rigid barrel, utilising a muzzle blast cone, and chambered for the standard 7.9mm infantry cartridge. The bolt is locked by locking flaps, rounded at the ends like rollers.

## 2 Fully-Locked Forerunners

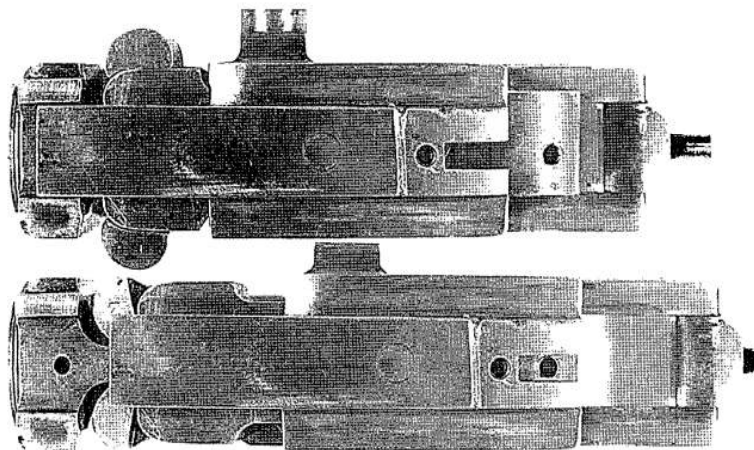


2. Left and right side views of the Hunneshagen rifle, first developed for the IWG (*Inspektion für Waffen und Gerät der Reichswehr*) in 1924.

The action of this initial version, now held in the BWB

*Around the muzzle end of the barrel is a tube-like jacket, ending in a breached nozzle. As the bullet passes the nozzle, the following gases drive the jacket several centimetres forward. The jacket is connected to an operating rod, located in the stock beneath the barrel, [and thence] to a transverse swivel lever which surrounds the barrel at the position of the cartridge chamber. With the forward movement of the jacket and the rod, the lower part of the swivel lever is drawn forward, causing the upper part to move rearward, hitting a short, flat piston. The piston is driven rearward to abut against the upper face of the bolt carrier, compelling it to move to the rear and withdraw the locking flaps. This unlocks the bolt from the receiver, and allows it to move back with the bolt carrier . . .<sup>1</sup>*

collection, is described in the text. A later version, now in the Military Historical Museum of St Petersburg, Russia, is fitted with a gas piston. The bolt assemblies on both versions appear quite similar. courtesy BWB/WTS



3. Top views of the bolt assembly of the 1924 Hunneshagen rifle.

Above: bolt in locked position, showing rounded locking flaps extended.

Below: bolt in unlocked position, showing locking flaps retracted. courtesy BWB/WTS

## The Siemens-Schuckert Roller-Lock Patent of 1929

Patent no 582 097, titled “Breech Locking Mechanism for Firearms”, was granted by the *Reichspatentamt* to the electrical firm Siemens-Schuckert of Berlin-Siemensstadt on February 14, 1929.

A brief account of the rifle which embodies the patent in question is as follows:

*. . . Another self-loading rifle, developed by the rather unlikely firm Siemens-Schuckert, well known for its electro-technical products which*

*were exported worldwide, was displayed in 1931 . . . probably a result of the 1922 Reichswehr investigation of the possible potential for the manufacture of new war material by firms not usually associated with armament production. Military Intelligence letters to the WaA dated June 3 and June 17, 1931 describe this rifle as “a smooth-stocked weapon with a bolt that could be folded to the rear, and magazines for 10 and 15 rounds.”*

*No actual examples of the Siemens rifle have been located, and so there is not much more known*

1 *Sturmgewehr!*, pp 29-30

DEUTSCHES REICH



AUSGEBEN AM  
8. AUGUST 1933

REICHSPATENTAMT  
PATENTSCHRIFT

№ 582097

KLASSE 72h GRUPPE 101

S 89953 XI|72h

Tag der Bekanntmachung über die Erteilung des Patents: 20. Juli 1933

Siemens-Schuckertwerke Akt.-Ges. in Berlin-Siemensstadt

Schloßverriegelung für Feuerwaffen

Patentiert im Deutschen Reiche vom 14. Februar 1929 ab

4. The title page of Deutsches Reichs-Patent no 582097, titled "Breech Locking Mechanism for Firearms", granted to Siemens-Schuckertwerke AG of Berlin-Siemensstadt on February 14, 1929. courtesy Walter Schmid

about it, except that the locking principle, an early form of roller lock, was granted Deutsches Reichs-Patent (DRP) no 582097 on February 14, 1929.<sup>2</sup>

A translation of the patent disclosure, kindly prepared for the author by Willem-Jan Zirkzee, is excerpted as follows:

. . . An illustration of the invention is shown in [patent] figs 1 to 4. Figs 1 to 3 show the position of the lock and locking mechanism in three different phases of movement, while fig 4 shows a special shape of the locking roller.

Fig 1 shows the position of the parts during the forward movement of the bolt, fig 2 shows its position at the beginning of the locking movement, and fig 3 shows it after the locking process is completed.

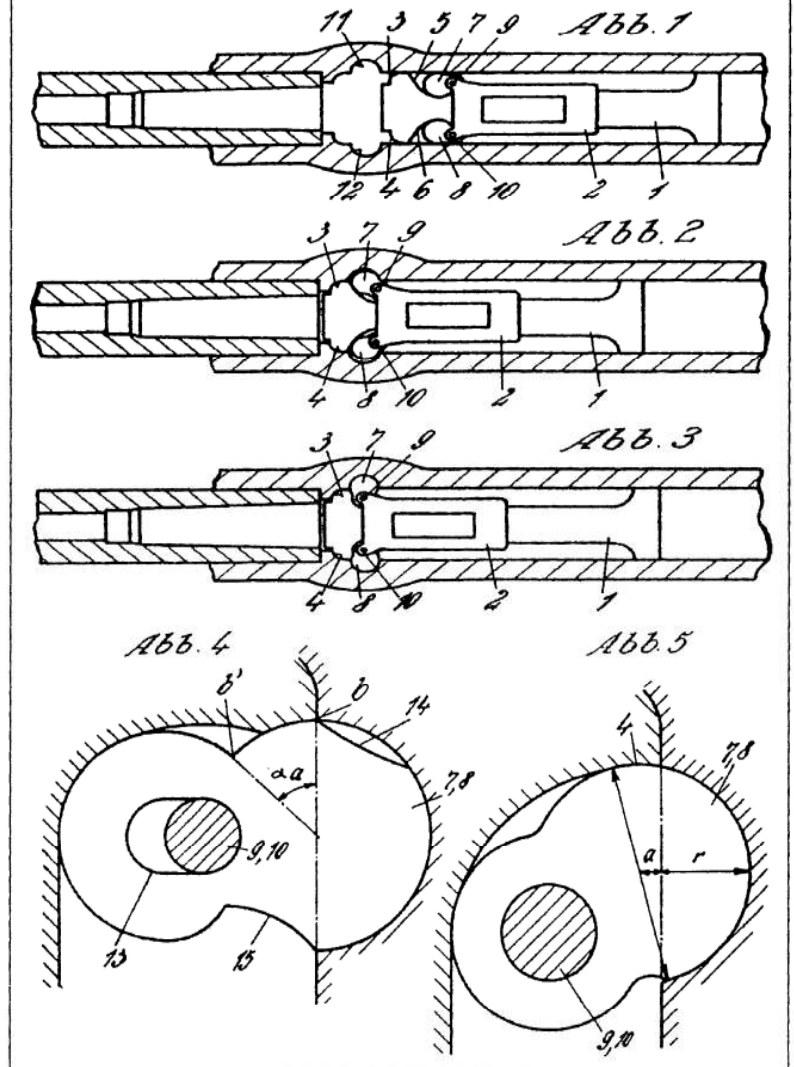
. . . The bolt head touches the receiver with surfaces 3 and 4. In addition the receiver is fitted with sloping surfaces 5 and 6, which serve as guides for the locking rollers. These consist of cylindrical parts 7 and 8, which are eccentrically kept in place by pins 9 and 10. The recesses 11 and 12 in the receiver serve to support them.

As shown in fig 1, the locking rollers 7 and 8 at first do not obstruct the path of the bolt. When bolt 1 touches the receiver with surfaces 3 and 4 the locking rollers 7 and 8, guided by surfaces 5 and 6, are pressed into corresponding surfaces 11 and 12, as shown in fig 2. When the collar 2 moves forward further, they will eventually be completely pressed into recesses 11 and 12, as shown in fig 3

. . . Since this new mechanism only has to bear the

Setting the Stage 3

Zu der Patentschrift 582097  
Kl. 72h Gr. 101



5. Drawings from the patent disclosure showing the Siemens-Schuckert roller locking system, the action of which is described in the text. courtesy Walter Schmid

pure forces of pressure, it can withstand rather large forces without it resulting in movement [opening] of the locking mechanism . . .

Fig 4 shows a special form of the locking rollers 7 and 8, which is extremely efficient, since it rules out the possibility of the collar 2 to jam when moving backward. Since the locking rollers are positioned eccentrically, they not only rotate when collar 2 slides backward, but they also move at the same time. If one wishes to avoid jamming the mechanism as shown in figs 1 to 3, then one has to make the recesses relatively small. However, this will result in high pressures on these surfaces, which could result in deformation of these sur-

faces. To avoid this, the locking rollers 7 and 8 are fitted with elongated holes 13 into which pins 9 and 10 grip. At the same time they are faced off, as indicated by 14 and 15. When the collar 2 now starts moving backward [in response to some unspecified impetus, presumably either as a result of barrel recoil or the impingement of a gas piston], the locking rollers will first rotate around angle *a*, that is, until point *b* of slope 14 has reached point *b'*. Now the locking rollers can start sliding sideways, without the possibility of jamming. One can see that in this arrangement the reduction of the contact surface is of little importance, since the force of the pressure is not directed towards the faced-off surface.

Another possible model is shown in fig 5. In models 1 and 4, the pressure of the sloped sides of the bolt is directed to the exact centre of the cylindrical rollers. Thus half a cylindrical shape will

have to be turned and pulled out of the locking recesses. On the contrary, in the mechanism shown in fig 5, the centre of the locking roller around the distance *a* lies outside of the locking surface. The distance *a* is large enough to self-lock when the bolt pushes against the locking rollers. However, even a tiny pull on the locking collar will be enough to pull the locking rollers out of the locking recesses, even when these are pressed tightly into those recesses . . .

As discussed in Chapter Four of this present book, it was in fact this early Siemens patent which was cited as prior art by the German Patentamt (Patent Office) in their refusal to grant Mauser's wartime patent application no V318, "Lock mechanism for fire arms", which concerned the firm's half-locked roller system.

## The Mauser Fully-Locked (*Starrverriegelt*) Roller System

As discussed in the early chapters of this book, a fully-locked (*Starrverriegelt*) roller system was developed at Mauser beginning in 1942, and utilised in three basic experimental weapon types, as follows:

1. A conversion of the 7.92x57mm flap-locked Walther G43 to the roller lock system (the *Gerät 03*);
- 1a. A further simplified version of the G43 with a stamped receiver and roller lock, termed the "final solution" in Mauser documentation (the *Gerät 07*);
2. A new "machine pistol" (MP), intended as a simplified replacement for the MP44, firing the 7.92x33mm *kurz* cartridge (the *Gerät 06*);

3. The MG215 aircraft machine gun, originally developed for the 13x64B MG131 cartridge.

The MG42 itself, while not a Mauser project, had originated as part of a competitive developmental project in 1937. The MG42 can also be considered to possess a type of fully-locked roller action, featuring waisted rollers which are operated by short barrel recoil.

The one thing all the above designs had in common was that an external impetus, provided either by barrel recoil or by a gas piston, was necessary before the unlocking process could begin.

## A Pre-Existing *Halbstarrverriegelt* (Half-Locked) Action

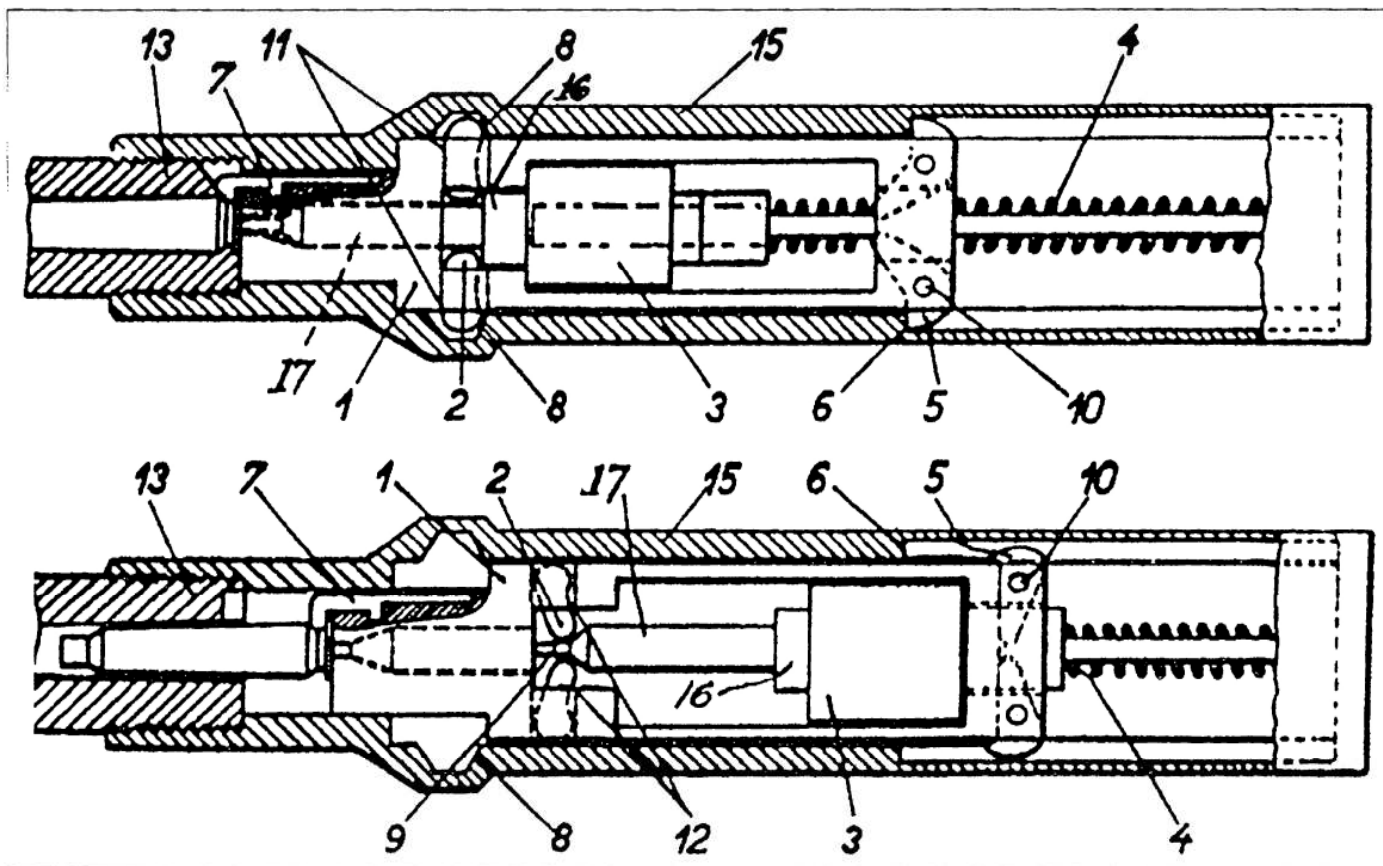
### Polish Origins of the MG42?

At least one forerunner of the true half-locked roller system was developed prior to World War II. As recorded by author Folke Myrvang in his 2002 Collector Grade title *MG34 - MG42: German Universal Machineguns*,

. . . Many books and articles claim that the bolt locking concept of the MG42 was taken from a patented Polish prototype. Edward Stecke of Warsaw, Poland, was granted US patent no 2,089,671

on August 10, 1937, titled "Automatic Firearm". Details of this design were apparently acquired by the Germans after the invasion of Poland in September, 1939.

The patent in question was filed by Edward Stecke in 1934, and thus the details of this design may well have been known to the WaPrüf2 in 1937. This is mentioned in a postwar *Unterlüss* report by Ott von Lossnitzer, the erstwhile technical director of the Mauser company.



6. Drawings from the disclosure of US patent no 2,089,671 titled "Automatic Firearm", granted to Edward Stecke of Warsaw, Poland, on August 10, 1937.

The action of the numbered components is described in the text. courtesy James Alley Jr, PhD

. . . the Stecke patent covers a locking mechanism that must be classified as "semi-rigid". The bolt is not locked by the type of cylindrical rollers that were used in the MG42 but rather, in the language of the patent, by "two two-armed levers". This patent thus had less to do with the MG42 than the later "half-locked" MG42V and MG45, and the

cost savings which would result from having fewer moving parts in the mechanism are mentioned in the patent description.

An excerpt from the patent disclosure describes the action, with relation to the two drawings shown in [fig 6], as follows:

" . . . Within the breech block 1 is slidably mounted a member 3. The breech block 1 is locked in the firing position by means of two two-armed levers 2, the outer arms of which bear against inclined walls 8 of recesses formed in the gun chamber 15, whilst the inner arms of the levers bear upon the plane face 16 of the slidable member 3 . . .

"At the moment of firing, the breech block moves backwards. At the same time the locking levers 2 turn owing to the pressure exerted upon them by the walls 8, about points 11 representing at that moment the fulcra, until the levers strike the walls of the cylindrical part 17 of the sliding member 3, limiting their turning movement. During this turning movement of the locking levers, which is very rapid, the inner arms of the locking levers act upon the plane face 16 of the movable sliding member and throw the slide backwards with considerable velocity.

"This backward movement of the slide 3 completely releases the locking levers 2 as shown in [the lower patent illustration]. The locking levers then slide along the inclined walls 8 of the gun chamber 15 and enter into suitable recesses within the breech block, touching in this position the point 9 of the striker pin and entirely releasing the breech block 1 . . ."

## Neither the MG42, nor the Mauser *Geräte*, Take Full Advantage of the Stecke Patent

As indicated, the salient feature of the Stecke design was that no external impetus was needed—the pressure developed in the fired cartridge was all that was required to force the breech block rearward to initiate the delaying action of the two-armed levers, after which, as described in the patent disclosure, the breech block was “entirely released”.

This being so, the claim that the Stecke patent formed the basis for the action of the MG42 should perhaps be re-examined, because if the essential masterstroke of the Stecke patent had been implemented, the resulting German designs would each have been simpler. No recoiling barrel, as found in the MG42, nor gas piston, as found in the Mauser *Geräte* 03, 06 and 07, would have been necessary.

## The Half-Locked Roller System in WWII

As mentioned above, the *halbstarr verriegelten Rollenverschluss* (the “half-locked roller system”) was developed in Germany by two different companies during the latter years of World War II.

The MG42V (MG45) was, essentially, an MG42 simplified by the addition of the half-locked roller action system, which meant that the recoiling barrel of the MG42 was no longer required. Versions of the

MG42V were developed by both Grossfuss and Mauser, although only the Grossfuss version was given the nod by *WaPrüf2* for further development.

Another Mauser development, the *Gerät* 06H, was essentially a modified *Gerät* 06 fitted with the half-locked roller system. This simplified the construction considerably by obviating the entire gas cylinder, piston and spring assembly.

## Postwar Proliferation

For several reasons, mainly the ever-increasing exigencies of the terminal stages of the war, none of the experimental designs discussed above was developed much beyond the prototype stage.

After the war, however, it was a different story. The merits of the half-locked roller action system were exploited first in postwar France, then in Spain, and also in Switzerland.

Finally, as West Germany was slowly allowed to turn away from the painful reminders of the war years and rebuild its military as part of the NATO alliance, the roller lock returned, “Full Circle”, as the action principle used in the G3 rifle, adopted in 1959

by the *Bundeswehr* (the West German Federal Forces) and manufactured in the hundreds of thousands by two German companies, Heckler & Koch and Rheinmetall.

In later years, Heckler & Koch utilised the roller-locked action of the G3 as the basis for the development of a vast catalogue of specialised sub-machine guns, carbines, rifles, and magazine- and belt-fed machine guns, in various chamberings from 9mm Parabellum right up to, believe it or not, .50 calibre.

An excerpt from an undated, typescript “H&K Weapons Systems” brochure, produced by Heckler & Koch, Inc of Arlington, Virginia, reads as follows;

### *Countries Utilising Heckler & Koch Military Weapons Systems*

*. . . H&K weapons systems have been adopted as standard and are manufactured in many nations of the world. To date a total of six to seven million G3 and HK33 rifles have been produced and they are employed in 50 countries worldwide. A total of 50,000 HK21 and HK21A1 [LMGs] have been produced to date and delivered to some 20 countries.*

*Countries licensing and manufacturing the G3 and HK33 are: United Kingdom, Portugal, France, Sweden, Norway, Greece, Turkey, Pakistan, Saudi Arabia, Thailand, Colombia, Malaysia, Burma, Brazil, and Nigeria.*

All the above subjects, plus a good many more, are discussed in detail in the following pages.

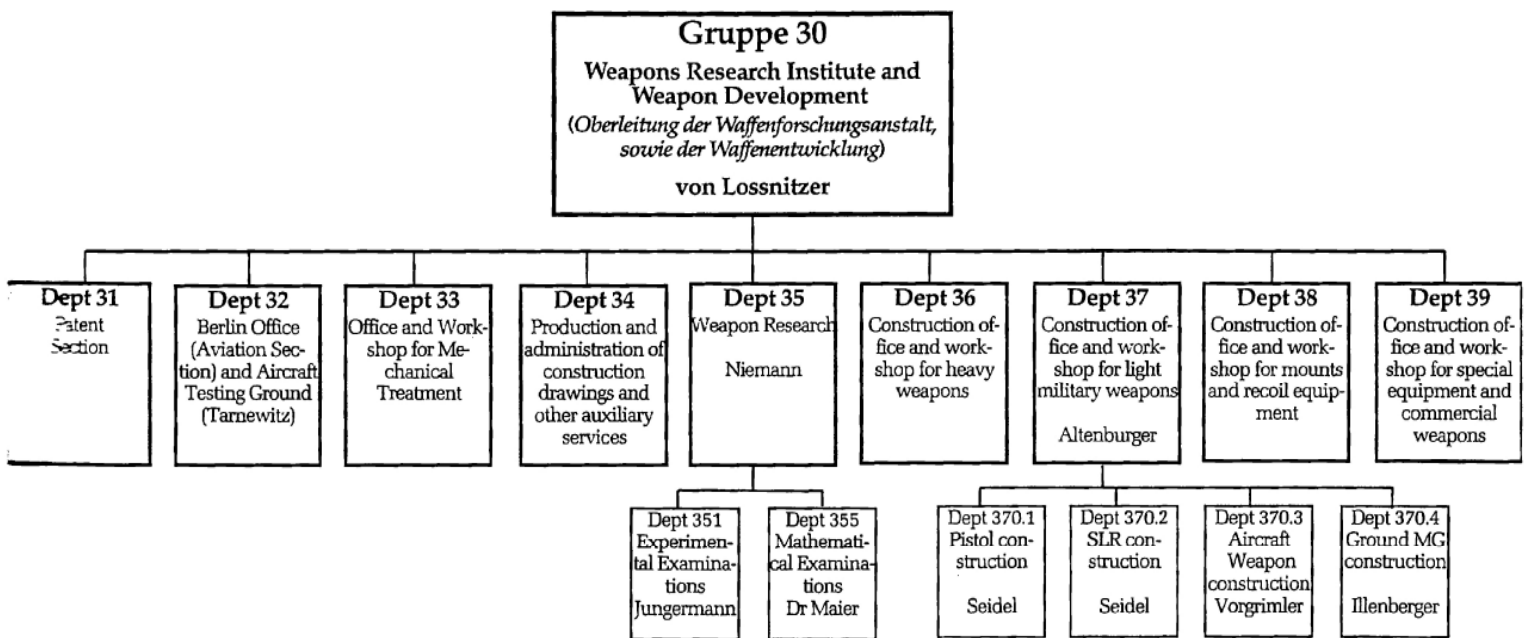


# Part I: WWII German Origins of the “Semi-Rigid” Roller Lock

## Chapter One

# Mausers First Roller Locks

## Inside Gruppe 30



7. A wartime organisational chart of *Gruppe* (Group) 30 at Mauser's Oberndorf facility, the *Oberleitung der Waffenforschungsanstalt, sowie der Waffenentwicklung* (the Weapons Research Institute and Weapons Development Group), under Director Ott von Lossnitzer. The main areas of interest for this study are Departments 35 and 37, and several important sub-departments of each are shown, along with the names of their responsible officers.

As can be seen, each department within the main group had a specific role to play in the development and production of military weapons and sporting arms.

drawing by the author  
from material supplied by Walter Schmid

## Director Ott von Lossnitzer Initiates Several Roller Lock Projects

*Aktennotiz Nr 3217*

### *Discussion on Pistol and Self-Loading [Rifle] Development*

*June 1, 1943*

**T**he first Mauser document which introduces the plan to concentrate on a roller lock action for small arms was prepared and distributed over the signature of Ott von Lossnitzer, the director of *Gruppe* 30, the *Oberleitung der Waffenforschungsanstalt, sowie der Waffenentwicklung* (Weapons Research Institute and Weapon Development).

This document recorded the minutes of a meeting held on June 1, 1943. Besides von Lossnitzer, the following took part: Chief Engineers Starmanns, Altenburger and Jungermann; Manager Schweikle, Dr Engineer Lau, and Engineers Seidel, Vorgrimler, Stähle and Löffler.

Pertinent excerpts from the excellent translation of these minutes by the late Jim Stonley are as follows:

#### *Self-Loader (Rifle)*

*Work on the self-loader has up to this time taken place on a broader basis, therefore the following projects should be worked upon:*

- 1. Further design development, by Herr Schweikle, on existing models which have been fired.*
- 2. Falling block [system] after the proposal of Herr Seidel.*
- 3. Installation of a roller lock in the existing G43 (Walther model).*
- 4. New [type of] weapon with a roller lock.*

*During the visit of Col Kittel [of WaPrüf2] and Senior Civil Servant Dr Peter [“Stahlblech” (stamped-metal) Peter], from the official point of view, what was required first of all was only Project 3, installation of a roller lock in the G43(W) - after this, and into the bargain, should follow the alteration of the action body [housing] of the G43(W), to a stamped sheet metal model. As the other parts of the G43(W) allowed only slight alterations to be carried out, production in large quantities (would be) under way here.*

*Director von Lossnitzer, on the other hand, had advocated the viewpoint (to be followed up with the greatest vigour) that - in addition to Project 3 -*

*Project 4, “New [type of] weapon with roller lock” - should be continued.*

*The new demands of the (Ordnance) Office moreover forced a part of the - up until then - accomplished work to be closed down, and following this, an alteration of the work schedule, with a relative redistribution of the design staff, to be undertaken.*

*1. The point of main effort of the development rests in the problem [of installing] the Mauser roller lock in the Walther S/L [rifle and] during the same time as this development to fit [it with] a stamped sheet metal housing. Therefore it must be borne in mind that the demand for charger (clip) loading which was discarded, has been freshly reinstated by Col Kittel. The current Walther pattern allows magazine - as well as clip - loading.*

*Particulars over the use of a telescopic sight must be requested immediately from Berlin Head Office. A drawing [of it] will do, from which a dummy can be manufactured. Equally the promised consignment of a G43(W) must be urgently demanded. A G41(W) is to be requested for investigations into its functioning (taking of optical time/space curves). The greatest emphasis must be placed on these [items of] work, they must be pushed forward, in office and in workshop, with all the powers at our disposal.*

*2. As soon as work on the main point of development, as per paragraph 1, is granted, - Project 4 “New [type of] weapon with a roller lock”, is to be continued. The following design plans will follow from this:*

- a. Housing, in combination with metal fore-end, and wooden butt (laminated wood).*
- b. As occasion demands, and circumstances permitting, an accelerating lever will be used in the locking [system] as per Herr Schweikle’s prototype.*
- c. In the new project [the ability to use] clip loading will be omitted . . .*

# The Development History According to Mauser

Over the years a number of assertions have been published concerned with the development of the roller lock action in Germany during WWII, many made by people actively involved in these programmes. Portions of several of these recollections are interleaved within the following history, with inconsistencies edited out for a minimum of confusion. This editing has been found necessary because some of the assertions concerning the chronology, and even the nature of the developments themselves, are simply not correct. As most of the statements were made after, and in some cases long after, the events had taken place, many of these errors can be ascribed to a normal dimming of the recollective process over time.

Fortunately for us, a written history of the Mauser roller lock development programme is available, which records the events and the dates by which they had occurred. These brief notes are taken from the series of monthly confidential reports ordered by Mauser Director Ott von Lossnitzer and produced for him by the concerned departments at the Mauser factory from October, 1943 through to nearly the end of the war.

A translation of von Lossnitzer's rationale for this most valuable series of reports, which was contained in Mauser *Aktennotiz Nr 3357* dated October 21, 1943, is excerpted as follows:

*. . . During a preceding meeting Dr Quant and I decided that the research and development issues are not only now, but will also in the future be of decisive importance for our work. Therefore the ongoing projects will also be of interest to all other persons working for the arms industry on similar projects.*

*An ongoing written orientation regarding all projects will therefore be necessary and will take the form of monthly reports. These reports will consist of two main parts:*

*a. The survey of the most important research projects as well as the developmental projects.*

*Short reports on developments by other companies in our business will also be incorporated in this section.*

*The main part (a) will be divided into the following subsections:*

- 1. A list of all the contracts we are working on, per subject listed in chronological order, in order to give an insight into how long and with what progress these development projects are evolving.*
- 2. A list of new development projects started within the preceding month.*
- 3. A list of the projects created by the Mauser Research Department itself.*

*b. This is concerned with reports of the Patent Department, divided into the following sections:*

- 1. Comments on any changes regarding patents in Germany and abroad.*
- 2. A survey of the most important projects being tested at the time which are submitted as patent requests, giving the status of the patent requests already submitted for the factories in Oberndorf, Borsigwalde, and Karlsruhe [IWK], and listing any newly submitted requests for patents from these three factories.*
- 3. A survey of inventions submitted by third parties to the company on which work is being done.*
- 4. A report on the position of trademarks.*
- 5. A report on claims, both those which we have filed against the "protective rights" of others, and those which others have filed against us.*
- 6. Reports on any ongoing lawsuits.*

## 10 Two Simultaneous Internal Developments:

*All reported subjects must be dealt with in a clear and concise manner, without excess verbiage, although the important issues in the report should be described in such a manner that the other gentlemen of the Board are able to understand them clearly . . .*

*The first report should be issued regarding the position as at October 1, 1943. I would like to receive this report no later than October 29. In the future reports will be submitted by the concerned departments regarding the situation on the first day of that month, and should be presented to me within one week for further distribution.*

The importance of these monthly reports is inestimable to a history such as this, as they chronicle the exact month-by-month status of all the ongoing projects instigated by the Mauser company itself, along with those ordered by officials of the concerned military departments of the Army, Navy, and Air Force.

These projects concerned all the different types of arms then being developed by the Mauser firm, including naval, aircraft and anti-aircraft cannon, mortars, machine guns, self-loading rifles, machine

carbines, and pistols. Not only new designs but the development and testing of improvements in the methods of manufacturing these weapons and also bolt-action rifles, and the development of accessories and ancillaries for any and all of the same, were included.

In what follows we have excerpted the often lengthy Mauser monthly reports to concentrate on the developments concerning self-loading rifles and machine carbines incorporating one or other version of the Mauser-designed roller-locked action.

## Two Simultaneous Internal Developments:

### 1. The Gas-Operated 7.9x57mm *Gerät 02* Test Fixture

As noted, the first in the series of Mauser internal reports ordered by Director von Lossnitzer recorded the position of the most important research and

development projects during the month of October, 1943. Salient portions are translated as follows:

**Aktennotiz Nr 3373**

#### ***Monthly Report for October, 1943, dated November 4, 1943***

##### ***Self-Loaders and Machine Carbines***

*A new locking system has been developed for small calibre automatic infantry weapons. At the moment, functioning and measuring examinations are being carried out on a prototype.*

*The design of a self-loader in a pressed steel model - with regard to simplified production conditions - has been almost 90% completed; the*

*design of an automatic weapon for the official short cartridge (currently introduced for the MP43) is about 70% finished.*

*The firms of Walther and Gustloff are working on [other versions of] the self-loader and Walther and Haenel are working on the machine carbine.*

### **Enter Dr Karl Maier**

The most important person involved in the development of the roller lock action at Mauser was Dr Karl Maier, who in 1943 was a 31-year-old mathematician and physicist, the head of fifteen people in the *Mathematische Untersuchungen Berichtsablage* (literally the Mathematical Investigation and Reporting Group) under his superior, *Herr Direktor* Rudolf Nie-

mann of Department 35, *Waffenforschung* (Weapons Research). Dr Maier's job was to analyse mathematically all sorts of engineering problems related to small arms, and to report on suggested solutions.

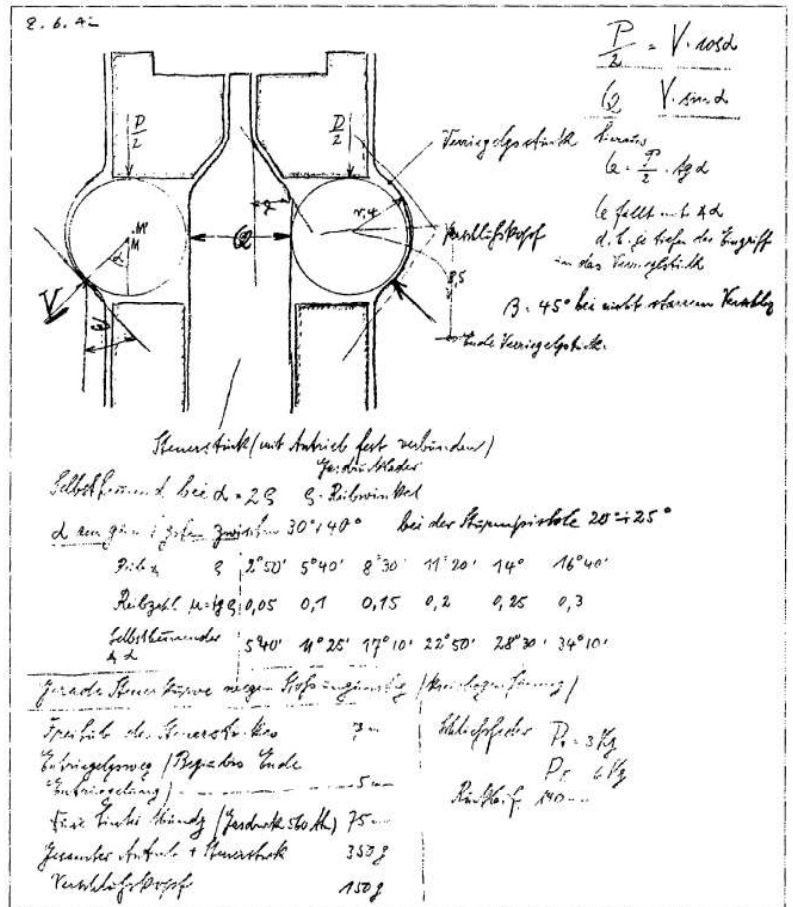
Regarding the earliest test rifle embodying the roller lock action, Dr Maier later recalled as follows:<sup>1</sup>

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1 letter to John McCabe, Curator, Springfield Armory Museum, dated March 15, 1996



8. Dr Karl Maier, mathematician and physicist, the head of fifteen people in the *Mathematische Untersuchungen Berichtsablage* (literally the Mathematical Investigation and Reporting Group) under his superior, Herr Direktor Rudolf Niemann of Department 35, *Waffenforschung* (Weapons Research). courtesy Walter Schmid



9. Dr Maier's drawing and handwritten calculations, dated June 8, 1942, of the stresses involved in the gas-operated, fully-locked roller action (note the straight-sided *Steuerstück* and firing pin, centred between the rollers).

courtesy Dieter Handrich and Walter Schmid

. . . rather late, in 1942/43, the Light Gun Department under Altenburger (Abteilung 37) came up with a new and elegant locking system (gas piston actuated): the bolt assembly consisted of two main pieces, the bolt head and the bolt carrier including a wedge piece, also two cylinders or rollers to engage recesses in the receiver for locking . . . The unlocking occurred here by a gas piston rod striking a head-surface of the bolt carrier, which then forced the rollers out of engagement in the receiver. The bolt carrier had received enough kinetic energy from the piston rod to complete its recoil and all automatic functions.

The first experimental rifle of this type employed the standard German infantry cartridge 7.9x57mm, and was designated as *Gerät* (equipment) 02.

An excerpt from a further postwar document prepared by Dr Maier, titled "Regarding Self-Loading

Rifles at Mauser Oberndorf", dated June, 1993, explains the concept and the flap-locked antecedent of the roller-locked action as follows:

. . . already a two-piece breech mechanism had been developed, consisting of a [bolt] head with light locking links (folding supports), which braced themselves in recesses of the housing during firing, and which could not give way. The second breech-mechanism part, the control piece [*Steuerstück*], carried the firing pin, was driven by the gas piston to unlock the folding supports and take along the bolt head, after certain free recoil and a safe delay.

Basically new in this locking system was the simplification of the folding supports, which were developed as simple rollers or cylinders. In the beginning of testing it was believed that the cylinders had to be supported by a stable jacket base at the housing (locking link). It was later on discovered that an ordinary line contact was sufficient.

## Time Out for a Red Herring: Investigating the “Blowback System”

A top-level meeting was held at the Mauser factory on November 11, 1943. Present were *Reg Oberaurat* Grill of *WaPrüf2/VII* along with Mauser Director von

Lossnitzer and Chief Engineers Niemann and Altenburger. After the meeting a memorandum was addressed to Dr Maier, as follows:

### Aktennotiz Nr 3381

## *Machine Pistols, Investigations and Technical Measurements*

*Conference at Oberndorf on November 11, 1943*

*Dr Maier*

*It has been planned to bring the blowback system into greater use than has been done up to date. The Mauser firm has received the contract to arrange the basic considerations and scientific measurements which are necessary in order to start the design of a blowback weapon for the present official short cartridge, and the present standard infantry cartridge.*

*WaPrüf2 have already arranged basic trials, in co-operation with other firms, which serve to determine the most favourable weight for the breech block; the investigation of various cartridge chambers (with and without flutes); the determination of the most favourable firing pin position, and the investigation of the effect of the recoil on the shoulder of the firer.*

*The investigations have shown that, in all probability, the official short cartridge can be fired from a blowback weapon.*

*The Mauser firm has already [in previous years] arranged basic investigations re blowback (or unlocked) weapons . . .*

*With the advantage of these previous tests, the Mauser firm shall carry out the special investigations, in the first instance with the short cartridge, because an investigation of the whole area on the widest basis is not possible due to the war affecting the circumstances . . .*

*After the conclusion of the above described investigations re the short cartridge, the work should—if the occasion arises—be extended to the standard 7.92mm infantry cartridge.*

*For the preceding work referred to, the Mauser firm has submitted a tender to WaPrüf2/VII . . .*

*With the contract, previously referred to, only the theoretical and scientific measurement studies are included. A contract on the determination of the design for the concept of the weapon has not, at the time being, been received by the Mauser firm.*

*For WaPrüf2  
[signed] Grill*

*For Mauser Werke  
[signed] Niemann*

### Aktennotiz Nr 3382

## *Monthly Report for November, 1943, dated November 12, 1943*

### *Self-Loader and Machine Carbine*

*The intensive tests on the study model fitted with the new [roller] locking mechanism will be continued.*

*The design of the self-loader has been completed, the design of the machine carbine for the MP43 short cartridge has been 90% completed.*

## 2. The Gas-Operated *Gerät 06*

Work continued on the gas-operated, roller-locked “machine carbine for the official short cartridge”, which according to the November, 1943 monthly report, above, was already 90% completed. The inception of this development is recorded elsewhere as follows:

*. . . Mauser Entwicklungstabteilen 37 (Small Arms under 15mm) under chief designer Altenburger, with designers Illenberger, Jungermann,*

*Stähle and Vorgrimler, created the Gerät [equipment] 06 (gas/rollers) for the 7.9x33mm kurz ammunition.<sup>2</sup>*

The first *Abteilung 37* blueprint drawing seen labelled “*Gerät 06*”, depicting the *Lauf* (barrel) for this new weapon, is dated November 1, 1943.

Dr Maier’s letter to John McCabe, quoted above, continues with his recollection of the inception of the first roller-lock in 7.92x33mm *kurz* calibre as follows:

. . . The early prototypes [for] the Kurzpatrone 43 (short cartridge) 7.9x33mm . . . were called Gerät 06. At the same time, receivers made of heavy

gauge sheet metal were introduced in various steps.

. . . The Gerät 06 [was] a conventional gas-operated rifle, not so much of interest here, except as a forerunner to the later retarded blowback type.

## The Roller-Locked G43: a Three-Fold Approach

As discussed in the internal Mauser monthly report for December, 1943, the installation of the gas-operated roller-locked action into a Walther G43 rifle chambered for the standard infantry 7.92x57mm cartridge branched into three separate projects dur-

ing the month, while work on the development of the Gerät 06, the gas-operated roller-locked machine carbine chambered for the 7.92x33mm kurz cartridge, was also continued, as follows:

### Aktennotiz Nr 3421

### Monthly Report for December, 1943

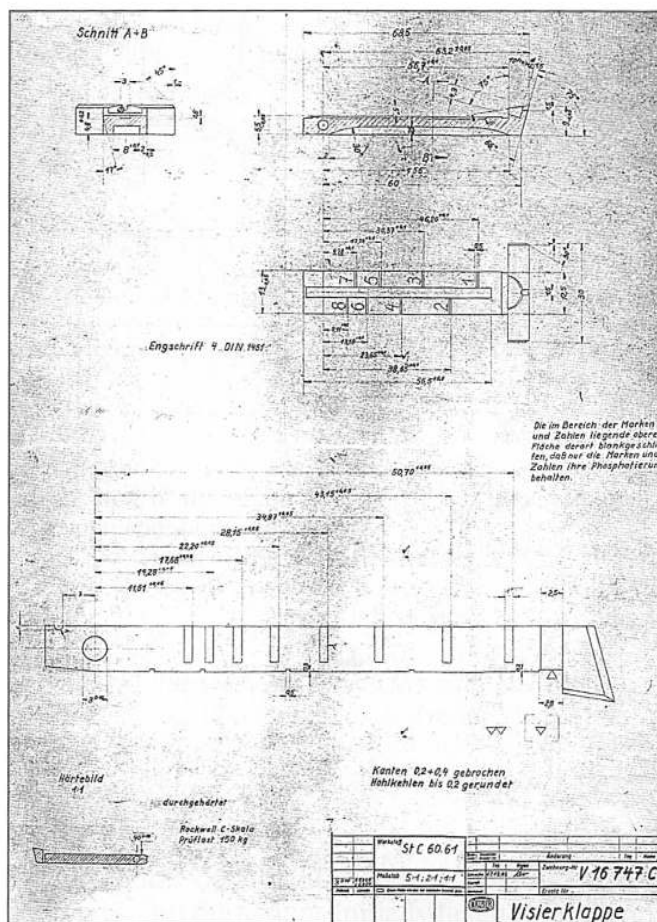
#### Self-Loader with Roller Locking

- a. Gerät [Model] 02. Study model for testing the new locking [system]. The result of the exhaustive functioning tests is good. The weapon is at the present time being exposed to a 5,000-round endurance trial.
- b. Gerät [Model] 03. Installation of the roller lock in the Walther S/L rifle. (Intermediate solution). The design is completed, the production of the part drawings and the construction of the parts are in progress.
- c. Gerät [Model] 07. New development with roller locking and completely simplified construction. (Final solution).

The design is 40% completed.

#### Machine Carbine with Roller Locking

The design has been completed, and the production of the part drawings, and the construction of the parts are in progress.



right). Mauser production drawing no V16747C dated December 17, 1943, titled *Visierklappe* (rear sight leaf), with range settings from 100 to 800 metres.

This is the earliest drawing seen of a component of the Gerät 06. courtesy Walter Schmid

## Chapter Two

## The Quickening

Origins of the *Halbstarrverriegelt* (Semi-Rigid) *Gerät 06H*

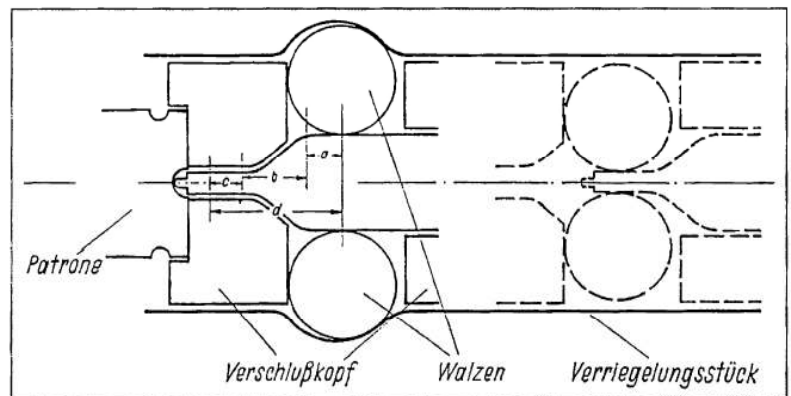
**D**r Maier's letter to John McCabe, quoted initially above, continues as follows:

. . . As a mathematician and physicist, my job was to apply mathematical methods to all sorts of engineering problems in small arms. In the fall of 1943 I was heading a test firing program on the *Gerät 02*, where time-displacement curves of the bolt parts were recorded and had to be evaluated.

In semi-automatic firing, the bolt carrier had shown a tendency to rebound from its front stop, leading to firing [from] a partially locked position, with excessive recoil velocities up to 30 ft/sec. The evaluations of the time-displacement records taken proved this behaviour. All the evaluation results and some conclusions were compiled in V-Bericht (Test Report) no 1453, dated December 10, 1943. I had found that the bolt assembly gets actuated not only by the impact of the gas piston but also by the cartridge case under residual gas pressure pushing on the face of the bolt head. Thus the actuation of the bolt assembly had two sources.

Right after writing this Test Report No 1453 (still available) in December, 1943, a new idea dawned on me: eliminate the gas piston actuation and drive the bolt assembly by the recoil force of the gas pressure acting on the face of the bolt head alone, by proper choice of the angles [on the *Steuerstück* (steering piece) and in the barrel extension].

A short mathematical analysis of the force transmission showed the feasibility of this idea. Together with my superior, Herr Direktor Rudolf Niemann, we informed Herrn Altenburger and some of his designers about this new design idea. And I followed it up by writing Test Report no 1481,



11. Drawing from Dr Maier's V-Bericht no 1453 of December, 1943.

If the *Steuerstück* is within area 'a' when the arm fires, the bolt will stay locked, but if the bolt has rebounded sufficiently to allow the *Steuerstück* to be positioned within area 'b', the action will be only partially locked and will open spontaneously.

As discussed in the text, this phenomenon gave Dr Maier the idea of a purposely constructed half-locked action. courtesy Walter Schmid

dated January 14, 1944, with the title "Halbstarrer Walzenverschluss" (half-locked roller locking system). I had always claimed to have written this report and to have made the first proposal of this actuation principle . . .

Another document which elaborates on this epiphany and the actions initially taken to follow up the idea was written and signed by Dr Maier in June, 1943. An initial portion of this memorandum, titled *Zur Entwicklung des halbstarren Rollenverschlusses*, is excerpted from translation as follows:



## Concerning the Development of the Half-Locked Roller Action

After writing V-Report no 1453 in December, 1943, wherein I had noticed the tendency of the roller breech mechanism to self-unlock, I could not keep from thinking about this subject. [Dr Maier was here referring to his experiments with the gas-operated *Gerät* 02 test fixture, chambered for the standard 7.92x57mm cartridge, wherein due to bolt rebound he had noticed this phenomenon of self-unlocking occurring about 50% of the time.]

It was obvious that by the choice of angles at the locking piece and the control piece, only a fraction of the breech block impulse was transferred to the control piece. In spite of this, during semi-rigid firing (rollers at the bevels sitting too close to the control piece), the recoil speeds measured were still far too high. The idea occurred to me to make the control piece as heavy as possible, and thus prolong the gliding time of the rollers along the bevels of the control piece and delay complete unlocking. A rough calculation showed that this would create breech mechanism speeds of 6 to 8 m/s after unlocking, which is in the desired range, [and that] therefore the present gas piston drive could be eliminated . . .

I took my idea up with Mr Niemann, and he immediately recognised the potential of this semi-rigid breech mechanism system. We agreed on a meeting with Mr Altenburger, and if I remember

correctly, he was present, as well as Mr Seidel and Mr Illenberger. Neither Mr Vorgrimler nor Mr Stähle were present. From our department, only Director Niemann and myself. I presented my ideas. Mr Altenburger's response was not enthusiastic. He thought this would not solve the bolt rebound problem, and the susceptibility of the breech mechanism to friction. Mr Niemann pointed out the exceptional simplification of the new semi-rigid system, which should definitely be tried out, but the meeting ended without any firm agreements or arrangements.

I used the following weeks to put my thoughts and calculations in V-Report [no 1481], so that the gentlemen of Altenburger's Design Department would be able to check their new construction against it . . . In this report I also recognised the EXCEPTION of this invention: in this case the designer, who usually passes his design to the theorist to check his calculations is not the inventor, but it is the theorist who has suggested an abstract system, and has thus initiated a new design on this basis. This observation was probably not welcome reading for the trade school engineers of Department V, considering their strained relationship with the personnel with university degrees

## Excerpts from Dr Maier's V-Bericht 1481

After the war Dr Maier's V-Bericht 1481, dated January 14, 1944, was translated by the British Armament Design Establishment (ADE) Small Arms Group at

RSAF Enfield and published as Central Technical Report No 017, dated February 17, 1949. Excerpts from this key document are as follows:

### General Remarks on Semi-Rigid Breech Mechanisms

In the blowback system, the body at first does not take part in the transmission of the impulse on firing (with the exception to the resistance to the extraction of the cartridge case). The breech mechanism takes up the total blowback impulse of the cartridge case. With ammunition of a higher capacity (that is with a larger blowback impulse) a heavier breech mechanism is required [and] the blowback system is only suitable for an ammunition with a low capacity.

A decrease of the impulse acting on the breech mechanism in comparison to the total impulse is only possible when a share of this total impulse is taken up by the body [receiver]. An exception to this case is when ignition takes place during counter-recoil. Such a decrease is very efficient

because a depreciation of the impulse by 50% reduces the energy by as much as 75%.

The actual division of the impulse between the body and the breech mechanism can be attained by various ways [and] it is characteristic in all these breech mechanisms that the actual division of impulse relies not only on dimensions and weights but also on the co-efficient of friction of the sliding surfaces. Therefore, semi-rigid breech mechanisms might also be called "braked" breech mechanisms.

The more impulse that goes into the body, the more sensitive is the whole system to variations in the co-efficient of friction. Self-checking [seizing] can easily take place and can only be avoided when the impulse acting on the recoiling parts is made smaller. The optimum between the maxi-

imum possible decrease of the impulse acting on the breech mechanism, and the smallest influence of friction, has to be found for each individual

### **The Roller Breech Mechanism as a Semi-Rigid System**

Trials have been carried out with the German experimental self-loading rifle 02, without any rigid locking system, the rollers lying close to the taper on the control piece [Steuerstück]. The angle of the taper being small ( $15^\circ$ ), the time of acceleration of the control piece was very dependent on friction. The roller breech mechanism represents a

#### **Static Force Transmission in the Semi-Rigid Roller Breech Mechanism**

The static force transmission from the face of the breech block across the rollers to the body, and to the control piece is very different to that experienced during firing, as additional forces will then appear, by the acceleration of the masses. A static experiment gives only an indication of the kind of force transmission and of the tendency of any deciding factors. It also permits conclusions to be drawn from the values of friction and of the methods of dispersing friction. Fig 3 [not available] shows the forces acting against the recoil spring during static unlocking. Here it is supposed that the co-efficient of friction is the same on all faces

#### **Preliminary Conclusions on the Semi-Rigid Roller Breech Mechanism**

According to the theoretical results, the weights of the recoiling parts of a semi-rigid roller breech mechanism can be decreased to  $1/4 - 1/2$  of the weight of the recoiling parts of a blowback system.

The recoil of the breech block during the gas pressure is additionally smaller (20 - 30%) with regard to the acceleration of the control piece. The condition is that the recoil impulse of the cartridge which is comparatively small, disperses on account of different friction of the cartridge in the chamber. This is the case when cylindrical or slightly conical-shaped cartridge cases are used.

The information for a cartridge case with a decided shoulder, e.g. the 7.92mm "short cartridge", used in either a blowback or semi-rigid system, is not at present known.

When the recoil impulse remains comparatively constant it is only the friction in the locking system itself, that can cause any discrepancies in the recoil velocities. Both static and dynamic tests show that the value of [the angles in the receiver] should be approximately  $45^\circ$ , and the value of [the angle on the control piece] should be greater than

design. This ensures the most satisfactory functioning, with small stresses and the least possible weight of recoiling parts.

semi-rigid system when the rollers lie close to the taper of the control piece . . .

The thrust against the face of the breech block partly accelerates the breech block, and part of it is transmitted, by means of the rollers, to the locking piece and to the control piece . . .

where the rollers work together. Under these circumstances the rollers cannot revolve during the movement needed for unlocking, but they must slide. Revolving could first take place when the friction between the rollers and the breech block on the one hand, and between the rollers and the control piece on the other hand, becomes very different . . . The recoil impulse of the cartridge, transmitted to the face of the breech block, is divided between the body and the recoiling parts (i.e. breech block and control piece), according to the dimensions, weights, and the values of friction

that of [the receiver angle]. Under these conditions the influence of friction is as small as possible.

Such a semi-rigid system will probably give satisfactory functioning without any particular attention being paid to lubrication.

According to kinematic - dynamic exploration, the semi-rigid roller breech mechanism appears to be useful for cartridges of small to medium capacity.

The system has the advantage of no "gas tapping".

Experimental investigation of each proposed design must be made to determine the influence of linear touching in reference to the friction, seizing, etc, during firing.

The initial portion of Dr Maier's June, 1993 memorandum, excerpted above, concludes "As far as I remember I did not hear from Department Altenburger for almost half a year in regard to their work on the semi-rigid breech mechanism . . ."

## Clearing the Decks: the End of the Straight Blowback Investigation

A turning point had definitely been reached, thanks to Dr Maier's investigations. At the same time, as recorded in the January, 1944 internal memoran-

dum, the investigation into a completely unlocked blowback weapon firing the 7.92mm *kurz* cartridge was abandoned:

**Aktennotiz Nr 3447**

### *Monthly Report for January, 1944*

#### *Studies of an MP for the Short Cartridge, on the Unlocked System*

*Theoretical investigations have suggested the adoption of a half-locked system. These investigations have shown that the advice given by the*

*Ordnance Office - of only an unlocked (blowback) system for the short cartridge - is not feasible.*

#### *Self-Loader with Roller Locking*



12. Right side view of a *Gerät* 03, a gas-operated Walther G43 fitted with the Mauser roller lock.

According to the January, 1944 monthly report, quoted

#### *a. Model 02 - Study Model*

*The endurance trials which were broken off at 5,000 rounds in favour of work on the Models 03 and 07, will be resumed in January.*

#### *b. Model 03 - Installation of the roller lock in the Walther SiL rifle - Intermediate solution*

*The production of parts has so far advanced that up to mid-January, two rifles are already assembled.*

#### *c. Model 07 - New development with completely simplified construction - Final solution*

*The design is 95% completed, the parts drawings are in progress.*

Interestingly, while the idea of a straight blowback weapon firing the 7.92mm *kurz* cartridge had quickly been deemed impracticable, it appears that the term “unlocked” was used for some time thereafter in the internal Mauser reports as a euphemism to mask further investigations—under the aegis of the experimental tender granted by *WaPrüf2*—into the feasibility of Dr Maier's proposed half-locked roller system.

Dr Maier's June, 1993 memorandum continues:

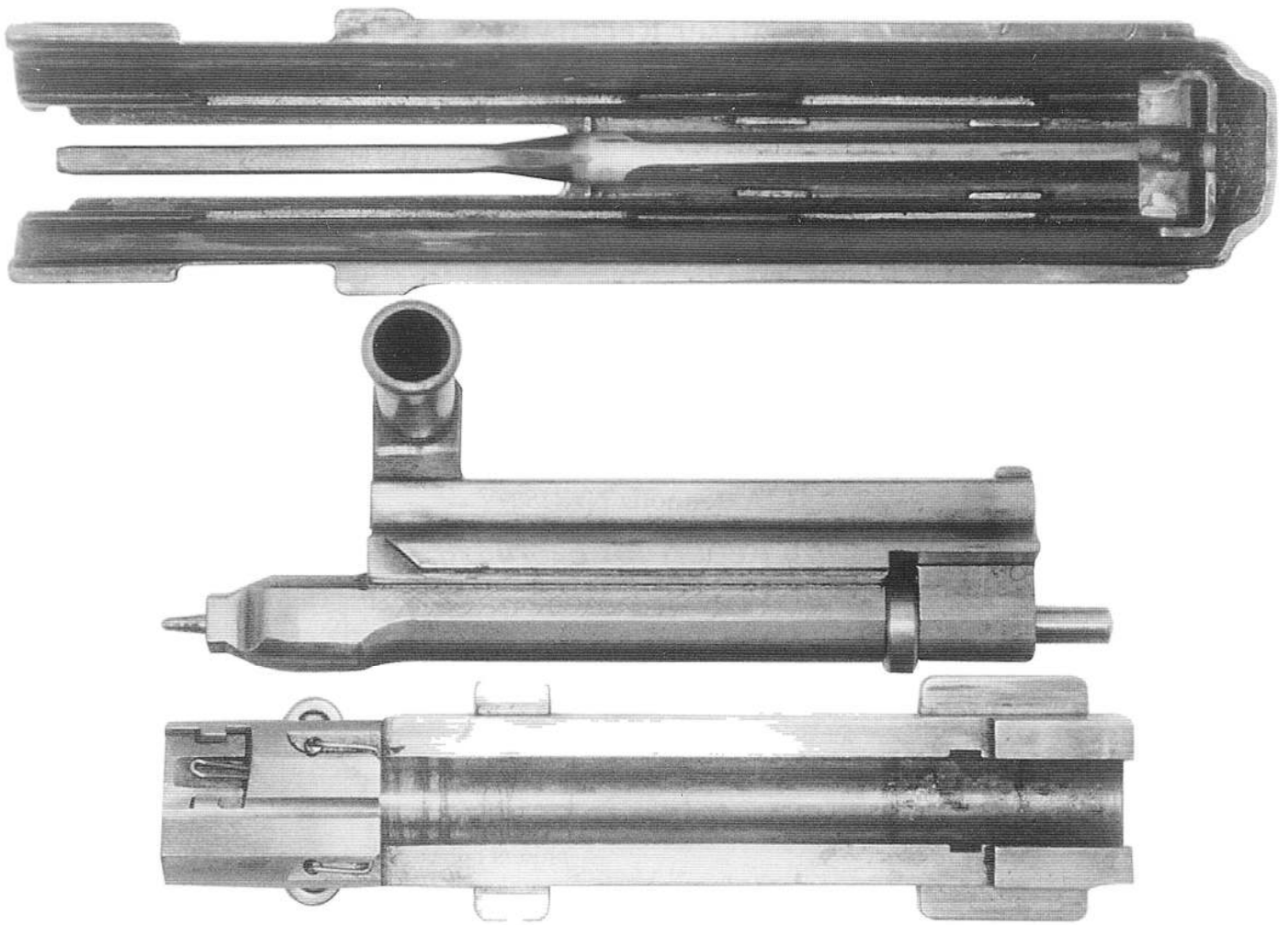
in the text below, two such rifles had been assembled by that time.

Aberdeen Proving Ground photo courtesy James Alley Jr, PhD



13. Left front three-quarter view of the *Gerät* 03 bolt assembly, shown in the fired position with the rollers extended and the firing pin forward.

Note the redesigned cocking handle, which is located on the *Steuerstück*. MoD Pattern Room collection, photo by Reiner Herrmann



14. The bolt group from the gas-operated Gerät 03, disassembled.

Above: underside view of body cover.

Centre: side view of parallel-sided Steuerstück, which carries the cocking handle and the firing pin.

Below: top view of bolt, showing rollers extended. Note the flat spring which retains the rollers and also acts as the extractor spring. This was the subject of Mauser patent application V-355, discussed in Chapter Six.

MoD Pattern Room collection,  
photo by Reiner Herrmann

. . . Even though Department Altenburger's reaction to our semi-rigid design suggestion at that time was silence, they did go into action then, with twice the effort: Mr Vorgrimler reports that in January, 1944 Mr Altenburger gave him the order to design a HEAVY MG based on the semi-rigid roller breech mechanism. Mr Vorgrimler did not mention, however, that the basic idea of the semi-rigid roller breech mechanism originated in Department Vu (Niemann). Considering Mr Altenburger's authoritarian style of management, I doubt that either Mr Vorgrimler or Mr Stähle were specifically informed in this respect.

The report of Mr Vorgrimler also shows that at that time (beginning of 1944) Mr Stähle was working on an AUTOMATIC RIFLE with semi-rigid

locking device, and Mr Vorgrimler [later] assisted with the grooved chamber. Apparently Mr Stähle received a design order for a semi-rigid automatic rifle from Mr Altenburger in January, 1944, at the same time Mr Vorgrimler did. Thus the Altenburger Department had started on two semi-rigid design projects . . .

In confirmation of this, the first Abteilung 37 drawing to be labelled "Gerät 06H" is dated January, 1944. This drawing depicts the redesigned Steuerstück (steering piece) with its precisely angled forward portion, which was the first new component needed to convert the gas-operated Gerät 06, with its straight-sided control piece, into the semi-rigid roller locked design as theorised by Dr Maier.

## Mauser Director von Lossnitzer Recalls this “Most Exciting” Period

After the war, Mauser Director Ott von Lossnitzer recalled this period from his perspective, as follows:

. . . [The semi-rigid roller lock] was the simplest design solution, if it would work. At Mauser I put three experts together, Mr Starmanns for the sheet metal component production, Mr Altenburger for the overall weapon design, and Dr Maier who, for the first time in the history of weapons development, had produced a mathematical analysis of the new mechanism before any actual weapon components were ever made. There was a lot of flak among the three experts and it took much of

my time to iron out the technical and personal wrinkles which always occur when some high-class people have to work together on a like-it-or-not basis. For me personally, it was the most exciting time of my entire career. I spent the major part of all my working time following up on theory, design, and sheet metal component development. The result was the “Mauser Sturmgewehr 45”, with a new two-piece bolt [which contained] two vertical rollers which slid in and out of two recesses in the breech ring . . . The most exciting thing was that the first weapon we ever built worked quite well . . .

### Aktennotiz Nr 3480

## Monthly Report for February, 1944

### Studies of an MP for the MP43 Cartridge (Short Cartridge) on the Unlocked System

Experimental Tender V.5823 on the basis of Document No 3381

For the experimental verification of [Dr Maier's] theoretical investigations, a model for firing - on this principle - is being built.

#### Self-Loader with Roller Locking

##### a. Model 02 - Study Model

The endurance trials have been carried out up to 8,000 rounds; 5,000 of which [have been fired] without oiling the rifle. At this point the endurance trial was discontinued, no defects having occurred with this rifle.

##### b. Model 03 - Installation of the roller lock in the Walther S/L rifle

Two rifles are already assembled. The testing [was carried out] with trouble-free functioning. A rifle has been submitted for an endurance trial, the

present position is [that] 2,500 rounds [have been completed].

##### c. Model 07 - Final solution with simplified construction

The design has been completed, work is in progress on the component drawings.

##### Assault rifle with roller locking

The first [Gerät 06] prototype was completed in the month of this report, in an un-casehardened state.

### Aktennotiz Nr 3506

## Monthly Report for March, 1944

### Studies of an MP for the MP43 Cartridge, on the Unlocked System

Experimental Tender V.5823 on the basis of Document No 3381

The experimental investigations, by firing a model on this principle [eines Prinzipmodells] have started.

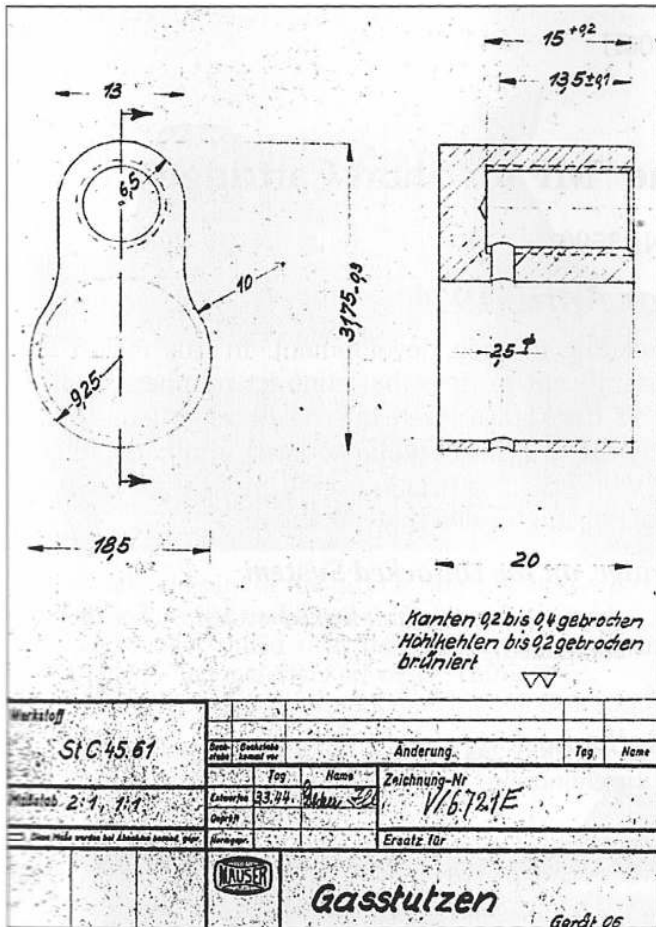
#### Self-Loader with Roller Locking

##### a. Model 02 - Study Model

The investigations with this model, which has served as a basis for development of both the

Models 03 and 07, have concluded with the termination of the endurance trials (8,000 rounds - 5,000 rounds of which were fired with the rifle in



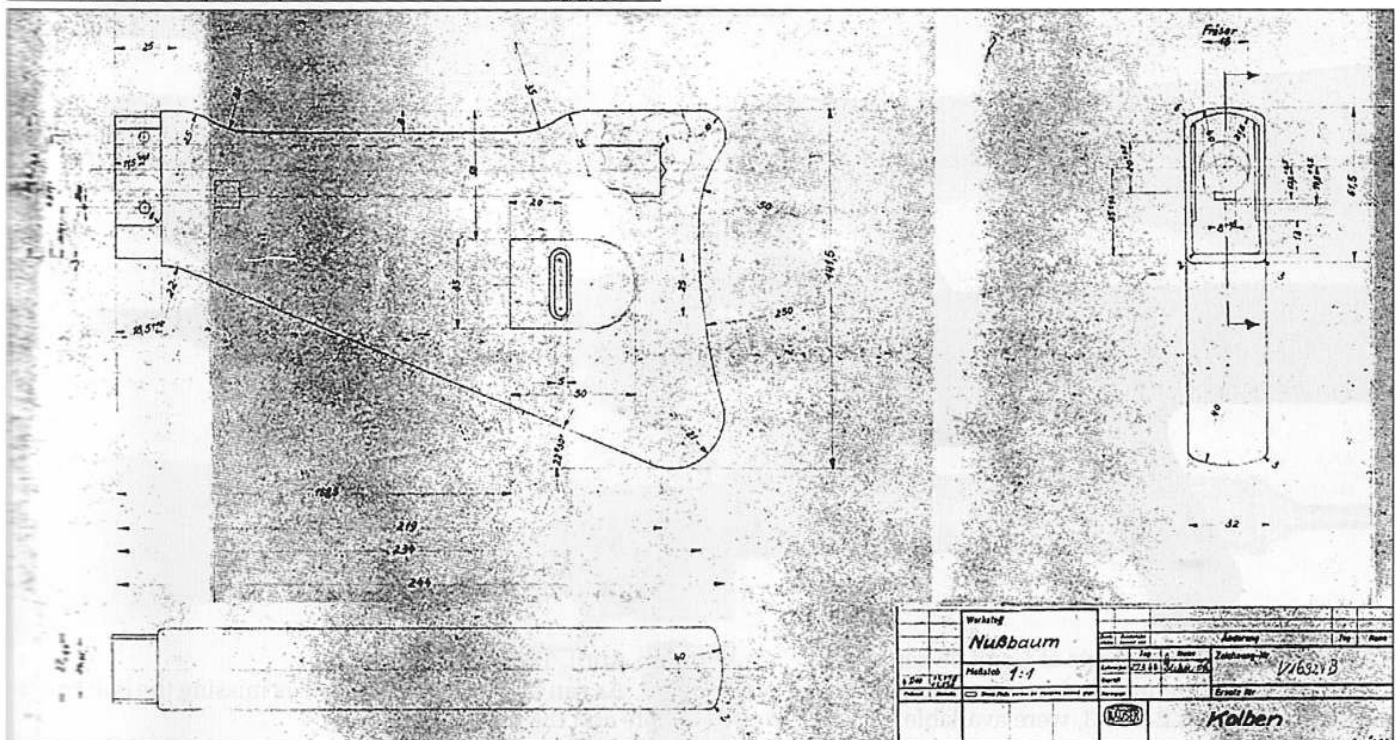


an uncoiled state). The evaluation of the total sum of this knowledge has been made known.

**b. Model 03 - Installation of the roller-lock, with pressed housing by Mauser, in the Walther SiL rifle**  
The position of the endurance trial is 6,000 rounds. Two rifles - which have been chosen by the Ordnance Office for investigations and testing at Kummersdorf - are being assembled.

**c. Model 07 - Final solution**  
Work is being carried out on the production of the component drawings, and the fabrication of the individual parts has begun.

15 (left). Mauser Gerät 06 production drawing no V16721E dated March 3, 1944, titled Gasstutzen (gas block).  
courtesy Walter Schmid



16. Mauser Gerät 06 production drawing no V16924B dated March 27, 1944, titled Kolben (buttstock).  
courtesy Walter Schmid

### Assault Rifle with Roller Locking

The first prototype has been completed, and was subjected to an endurance trial of up to 6,000 rounds in the presence of the authorities [of [Prüf2]. The firing trial proceeded quite well up

to some small faults, which were removed. The authorities have requested two further samples as soon as possible, for further testing at Kummersdorf.

## Official *WaPrüf2* Sanction for the “MP for Short Cartridge”

Aktennotiz Nr 3590

### *Monthly Report for April, 1944*

For the first time in the reported studies into the “Unlocked System” it was revealed in the April, 1944 *Aktennotiz* that it was the “half-locked” roller system which was being investigated.

Also for the first time, the format of the monthly report was altered to include the contract number

relating to each development. In this regard it is significant to note that contract numbers prefixed “M” (for Mauser) were internal developments funded by the firm itself, while contract numbers prefaced “V” (*Versuch* = trial) covered projects officially ordered and funded by *WaPrüf2*.

### *Studies of an MP for the Short Cartridge, on the Unlocked System*

V.5823: SS 0002-2573/43 H(1832) of February 23, 1944

The draft of the firing model - which is to be developed for the main technical measuring inves-

tigations for the half-locked system - has been completed.

### *Assault Rifle with Roller Locking*



17. Left and right side views of *Gerät* 06 serial no 2.

According to the text, below, two such weapons, presumably serial nos 2 and 3, were available for firing trials

in April, 1944.

As can be seen, this example is missing the bolt assembly and the buttstock.

SANHS collection, photo by Dolf Goldsmith

#### *M.7055, M.7064: Model 03*

Two of these are now ready for *WaPrüf2/I*. The date of the testing at Kammersdorf is being fixed by the Ordnance Office.

#### *M.7071: Model 07 - Final solution*

The individual parts are up to 90% completed.

#### *M.7066: Assault rifle*

Two weapons for *WaPrüf2/I* are ready for a firing trial at Kammersdorf. The date of the testing is being decided by the (Ordnance) Office.

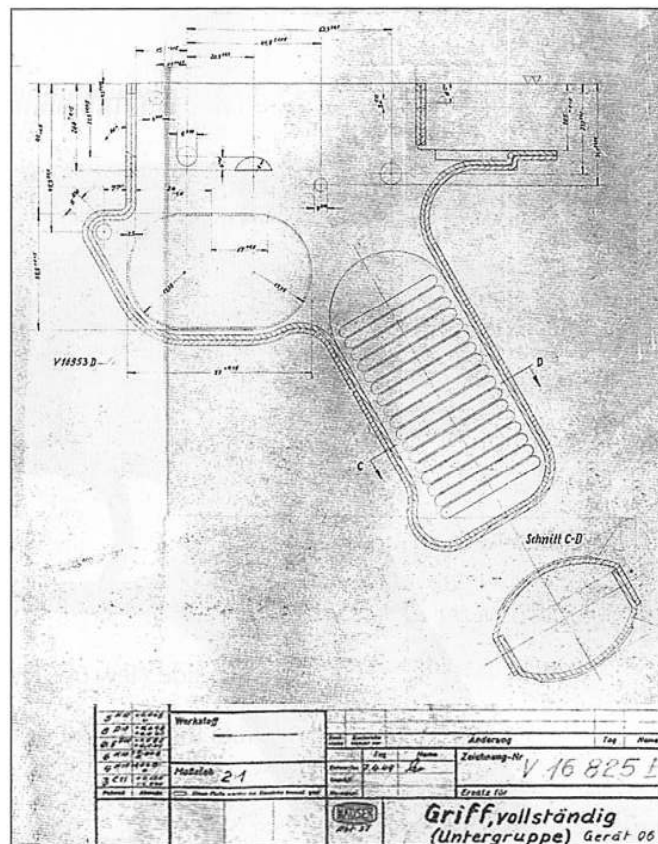




18. Left side closeup of the breech ring area of Gerät 06 serial no 2, showing markings.

Note the heat shield over the receiver, made of an impregnated linen material known as "Tuffnol".

SANHS collection, photo by Dolf Goldsmith



19 (right). Mauser Gerät 06 production drawing no V16825B dated April 7, 1944, titled Griff, vollständig (grip frame, sub-assembly).

Note the section C-D, below right, showing the way the two stamped halves of the grip are nested together.

courtesy Walter Schmid



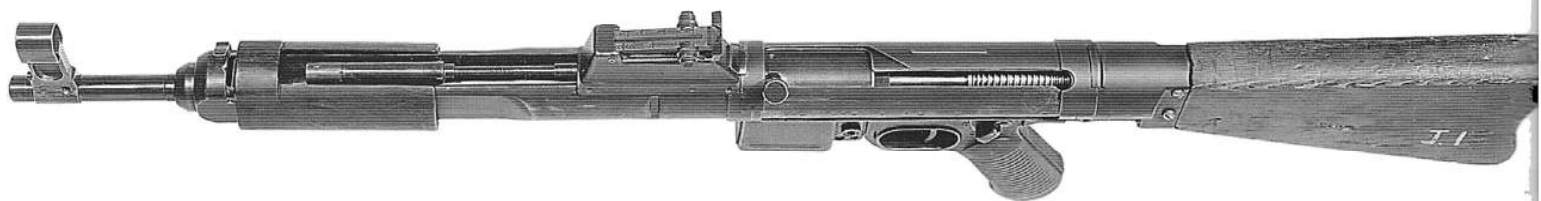
20. Left and right side views of Gerät 06 serial no 3.

A comparison of the buttstock shown here with the production drawing of this component, shown in fig 16, indicates that the above is a postwar replacement.

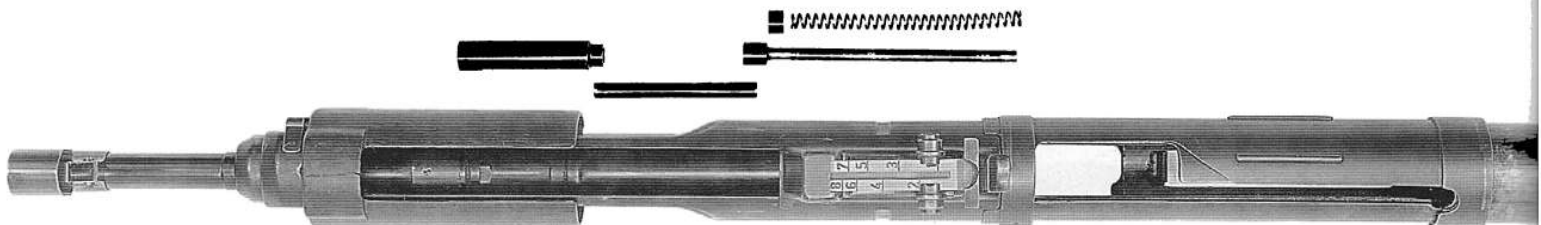
MoD Pattern Room collection, photo by Richard Jones



21. Left side view of *Gerät* 06 serial no 3, shown partially stripped.  
 Note the stamped metal gas system cover plate, at top left.  
 MoD Pattern Room collection,



22. Top left view of *Gerät* 06 no 3, with gas system cover removed to show gas piston assembly, and Tuffnol handguard slid forward.  
 courtesy Volker Kurtz, H&K GmbH



23. Top closeup of *Gerät* 06 no 3 with buttstock removed and gas system stripped, showing components.  
 From left: the stationary gas piston (screwed into the gas block on top of the barrel), the gas cylinder, connecting rod,

actuator rod and spring.  
 Note the similarity to the gas system used in the Walther G43 self-loading rifle. courtesy Volker Kurtz, H&K GmbH

## A Timely Cost Calculation: the Mauser Design Beats the MP43

Although the true nature of the investigations under the *WaPrüf2* development contract had been revealed in the previous month's report, the term "unlocked" continued to be used in several further monthly reports.

Meanwhile, with several Mauser half-locked assault rifle prototypes ordered for trial "as soon as

possible" at the *Erprobungsstelle Heer* (Army Proving Grounds) in Kammersdorf, the technical production office "Office Durenberg" in Bad Riesa, Saxony produced a comparison of the estimated production time and cost of the MKb42(H)/MP43, at 14 hours and 70 RM apiece, against the "MKb(M)" at 7-1/2 hrs, 50 RM apiece.



24. Left side closeup of Gerät 06 serial no 3. The buttstock assembly and its locking pin have been removed. The selector is set to "E" (Einzelfeuer; single fire). MoD Pattern Room collection, photo by Richard Jones



**Aktennotiz Nr 3622**

**Monthly Report for May, 1944**

However, it appears that the "half-locked" assault rifle project was not yet considered a particularly high priority:

*V.5823: MP for the MP43 Cartridge, on the unlocked system*

*The work had to be set aside, in the month covered by the report, in favour of other duties. It should be resumed once more at the beginning of June.*

*M.7055, M.7064: Self-loader Model 03 (Walther with Mauser lock)*

*Date for test firing had been set to June 1, 1944, but [the trial] has already taken place. Two further examples for trials by Mauser were completed.*

25 (left). Right side view of the complete grip assembly of Gerät 06 serial no 3, showing the hammer in the fired position. courtesy Volker Kurtz, H&K GmbH

**M.7071: Self-loader Model 07 - Final solution**

The parts are being assembled.

**M.7066: Machine carbine**

Date for test firing had been set to June 1, 1944 but [the trial] has already taken place. Two further examples for trials by Mauser were completed.

**Aktennotiz Nr 3641**

**Monthly Report for June, 1944**

**V.5823: MP for the MP43 Cartridge, on the unlocked system**

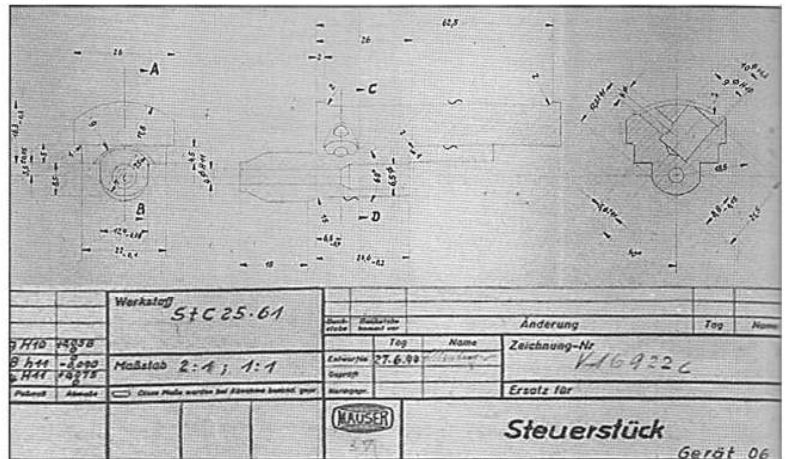
The investigations have shown that a trouble-free unlocked system is only possible with a grooved [fluted] chamber. The circumstances arising from this are a matter for further research.

**M.7055 and M.7064: Self-loader, Model 03 (Walther with Mauser lock)**

Two rifles were tested at Kummersdorf, in the presence of representatives of the firm. The examination amounted to a short firing trial for correct functioning and the so-called "violent test", such as covering with sand, (extreme) cold, various types of ammunition and primers. No delays [re functioning] have arisen from this. The authorities alone will carry out the further testing, and report re the result, or inform re possible wishes.

**M.7066: Assault Rifle**

The weapon was tested at Kummersdorf, at the same time as the self-loader 03, and in the same fashion. What has previously been said [above] for M.7055 is equally applicable here.



26. Mauser Gerat 06 production drawing no V16922C dated June 27, 1944, titled *Steuerstück* (steering piece).

Note the front view at right, showing the angled position of the hole for the cocking handle.

courtesy Walter Schmid

**M.7071: Self-loader, Model 07 - Final solution**

The work has been postponed, in favour of the work described above.

**Fluted Chambers a Necessity for the Half-Locked Roller System**

In his letter to John McCabe, Dr Maier briefly introduces the solution found to weapon malfunctions noticed particularly during adverse condition tests, as follows:

. . . the friction between the cartridge case and the chamber varied so much that the recoil velocity of

the bolt assembly varied over a wide and unacceptable range. This problem was cured by the introduction of a fluted cartridge chamber, which gave a rather constant actuation impulse on the face of the bolt head. Such grooves had first been noticed in Russian rifles captured during the Spanish Civil War.

**A Postwar BAOR Report on Fluted Chambers**

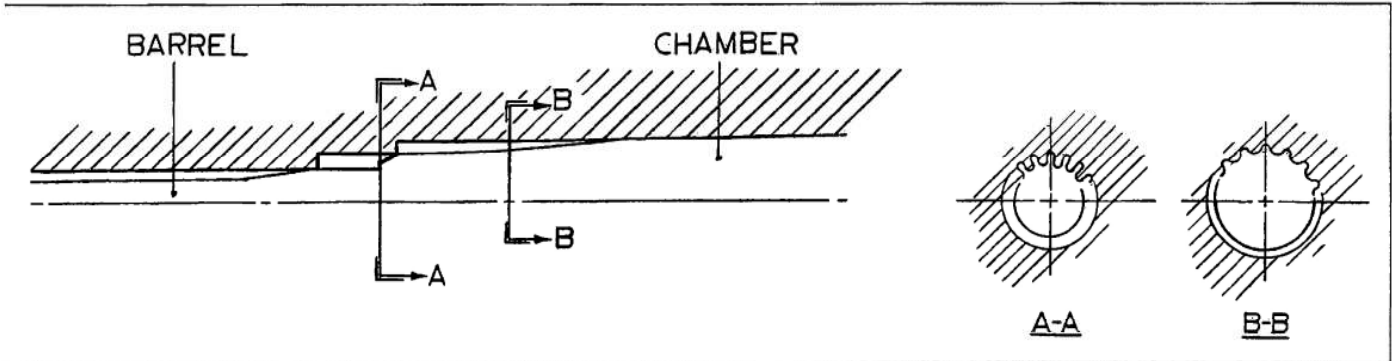
BAOR (British Army on the Rhine) Technical Intelligence Report No 40, dated October 20, 1945, contained the following analysis of chamber fluting provided during interrogation by *Dipl-Ing* Rudolph Niemann, the erstwhile director of Mauser's Department 35:

**Experiments with "case projection" MGs**

For some time experiments had been carried out at the Mauser plant in an attempt to eliminate the complicated and expensive locking systems in automatic weapons.

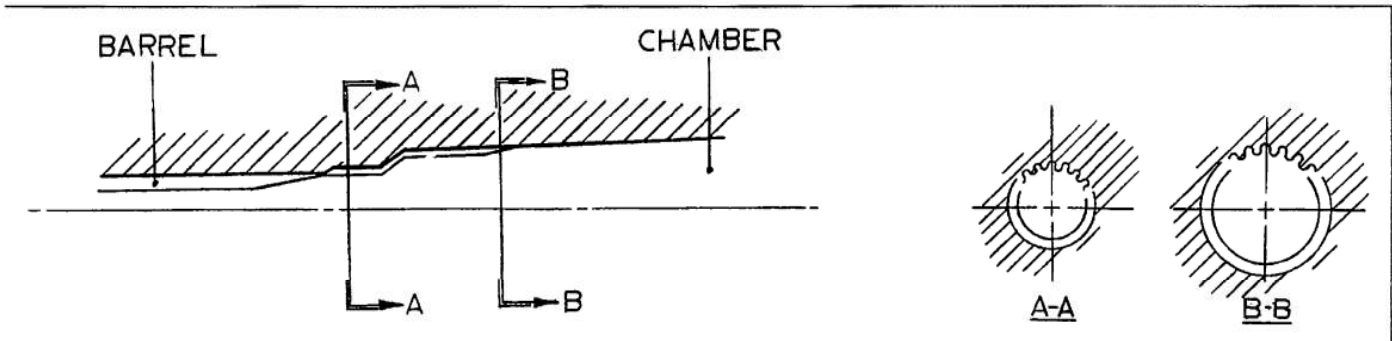
Efforts were made to produce a weapon to fire the full-charge 7.92mm ammunition using the simple "blow-back" or "case projection" system, but this was found impracticable for the following reasons:

- a. The weight of the breech block required was too great.
- b. The long cartridge cases tended to tear when moving under gas pressure.



27. Fig 1 from the postwar BAOR technical report on fluted chambers, showing the configuration of flutes which produced the best results in the experiment.

courtesy MoD Pattern Room Library, redrawn by the late Thomas B Dugelby

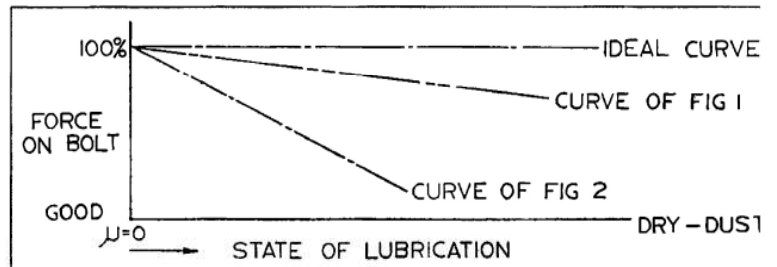


28. Fig 2 from the postwar BAOR technical report on fluted chambers, showing another configuration of flutes which produced less satisfactory results in the experiment.

courtesy MoD Pattern Room Library, redrawn by the late Thomas B Dugelby

The first difficulty was overcome by the use of a "transmitted inertia locking system" . . .

The second difficulty, that of torn cartridge cases, was overcome by the development of a grooved chamber. The rearward ammunition impulse in automatic weapons, especially when long cartridges are used, depends to a very great extent on the state of lubrication of the case and chamber [as shown in the following table]:



29. A graph from the BAOR technical report on fluted chambers, analysing the results of trials using chambers fluted as per report figs 1 and 2, above.

courtesy MoD Pattern Room Library, redrawn by the late Thomas B Dugelby

**Case Material**

brass  
steel (copper plated)

**Oiled**

4,500kg  
4,500kg

**Dry**

2,000kg  
500 - 700kg

As it is impossible under field conditions to ensure a uniform state of lubrication of the cartridges, attempts were made to achieve a state of constant and uniform friction by the mechanical construction of the chamber itself.

This was carried out by grooving the chamber and several experiments on these lines showed

that the shape of the groove had a great influence on its effectiveness (see [figs 27 and 28]). The best shape of groove so far developed gave a reduction in rearward ammunition impulse of only 20% between well lubricated and dry chambers.

Aktennotiz Nr 3670

**Monthly Report for July, 1944**

**V.5823: MP for the MP43 Cartridge, on the unlocked system**

*Grade I Priority*

*The investigations have shown that the fluted cartridge chamber does indeed produce an improvement, but this is not adequate however in [conditions of] mud and dust, in order to make safe the opening of an unlocked weapon. New ways must [therefore] be tried so that a weapon suitable for front-line use can be produced with this system.*

**M.7055, M.7064: Self-loader, Model 03 (Walther with Mauser lock)**

*Grade III Priority*

*Weapon Testing has tried the two prototypes, and once more would like two rifles with strengthened actions. The functioning [of the weapons] was*

*good. The weapon has lost its significance because of the [Machine Carbine]. The sniper's rifle, for which Mauser has, amongst other things, received a new development order, will appear in the future in place of the self-loader.*

**M.7066: Assault rifle**

*Grade I Priority*

*Weapon Testing has informed us of the result of the demonstration firing trial; and referring to the construction of the weapon, wish still for various alterations, which have immediately been taken into the work process. The durability of parts was good.*

**M.7071: Self-loader, Model 07 -Final solution**

*The work is being further postponed, in favour of the sniper's rifle.*

## Explaining the Priority Classifications

The above Mauser internal report for July, 1944 is the first to include a priority classification for each project. This subject is fully discussed and explained in Chapters Eleven and Twelve of Hans-Dieter Handrich's classic 2004 Collector Grade title *Sturmgewehr!* Briefly, by the summer of 1944 both manpower and materials—the essentials without which Germany could not continue the war—were being depleted at an ever increasing rate. With his *Führerbefehl* of April 22, 1944 Hitler had already ordered an austerity programme which severely limited the number of types of arms being manufactured and developed, and a number of special commissions had been established to oversee and enforce these new restrictions. A sub-committee of Albert Speer's

*Reichsministerium für Rüstung und Kriegsproduktion* (RmfRuK, the Ministry for Armament and War Production) called the *Sonderkommission Infanteriewaffen* (SKInfWaffen - the Special Commission for Infantry Weapons) was the agency responsible for all equipment issued to the infantry. The SKInfWaffen embodied a veritable “who's who” of the German arms industry, and included Mauser director Ott von Lossnitzer as Chairman.

At the first meeting of the SKInfWaffen on July 14 and 15, 1944, a complete listing of all the projects then under development was made and divided into three classes, based on their perceived importance or priority.

## The SKInfWaffen Reports Favourably on the *Gerät* 06H

As recorded in *Sturmgewehr!*, the second session of the SKInfWaffen was held at the Grossfuss factory in Döbeln on August 29 and 30, 1944, where models of both the fully-locked, gas-operated *Gerät* 06 and the half-locked *Gerät* 06H were demonstrated. After a meeting of the SKInfWaffen working staff on August 27 and 28, the latter was described as follows

**1. Ballistic Performance:**

*Same as MP44.*

**2. Short Description:**

*The weapon has a fixed barrel and a half-rigid bolt, which is yet to be tested in regard to field suitability. The weight of the weapon is 3.9kg [8.6 lbs.].*

**3. Construction Assessment:**

*The weapon's structure is similar to the MP44. The stamped steel parts are simpler, especially the round receiver. The gas system is eliminated and due to the dust cover, which has to be closed by hand, the inside of the weapon is completely protected. The trigger system is considerably simpler compared to the MP44. The cartridge chamber is eased [fluted] and the sight axis is 15mm lower*

compared to the MP44. Present development state: One sample of the principle tested with 1,000 rounds of single and sustained fire without major malfunctions.

#### 4. Functional Assessment:

The locking principle was theoretically calculated and tested with the sample of principle. Practical applicability to regular weapons has not yet been proven.

#### 5. Production Assessment:

The main parts like the receiver, pistol grip, and sight bases are simple sheet metal stampings (StVI23t and StVII23t) which require only little expense in regard to their means of production. The remaining stamped components are easy to manufacture. The machined parts are simple, and if subjected to proper heat treatment, they can be made from non-critical material.

### Aktennotiz Nr 3696

## Monthly Report for August, 1944

#### V.5823: MP for the MP43 Cartridge, on the unlocked system

At the last meeting of the SKInfWaffen it was resolved, for the present, to [increase] the extractor ratio, and to investigate obtainable ammunition for the future. The continuation of this project depends on the results of these investigations, whereby the prospects for the safe functioning of a blowback weapon will be decided. The clarification, which also holds good equally for the relevant competing weapons, should be carried out by us by the middle of October. In the matter of urgency, this project ranks immediately behind the MG42.

#### M.7055: Self-loader, Model 03 (Walther with Mauser lock) Grade III Priority

In addition to the current work at Mauser, a development in the direction of improvement of the locking system - is taking place at Walther's, the parent firm of this weapon. At the next meeting of the SKInfWaffen this should be mentioned - in addition to the Mauser development - in order that it can be decided which way further progress should lie. The Chief of Army Ordnance has him-

selfspoken out against the creation of a specialised sniping rifle. This development project with that [statement] again acquires increased importance. It must therefore be endeavoured to obtain the accuracy requirement for this rifle.

#### M.7066: Locked MP (i.e. Assault Rifle)

The work on this project has been interrupted. It must be taken up again, when the investigation instituted . . . on the blowback MP shows that that system is not serviceable for the present ammunition.

#### M.7071: Self-loader, Model 07 - Final solution

The project has been terminated - as have other similar concurrent proposals - at the request of the SKInfWaffen.

At the SKInfWaffen second meeting, held as noted at the Grossfuss firm in Döbeln on August 29 - 30, 1944, a further shuffling of priorities was also undertaken, based on the simple fact that "The number of projects approved and reported by the SKInfWaffen, as well as by the other special commissions, [had] exceeded the available capacities."<sup>1</sup>

## WaPrüf2 Abandons the Gerät 06

A similar assessment was made by the SKInfWaffen working staff regarding the Gerät 06, which at 4kg (8.8 lbs.) was slightly heavier than the Gerät 06H due to the components needed for gas operation. As recorded in *Sturmgewehr!*,

... the rigid roller locking system was adjudged to be practicable, but it was noted that since the appearance of the considerably more progressive

Gerät 06H, WaPrüf2 had no interest in the further development of the Gerät 06.

Mauser had constructed four samples of the Gerät 06 up to the end of August, 1944, and these had been tested with a total of 30,000 rounds fired, one of them with 12,500 rounds of single and sustained fire, with no major malfunctions reported. However, due to the decision of WaPrüf2 to support only the more sophisticated and simpler Gerät 06H, Mauser abandoned further development of the Gerät 06, and it must be assumed that

*the four mentioned specimens were the only examples of this weapon ever constructed.*

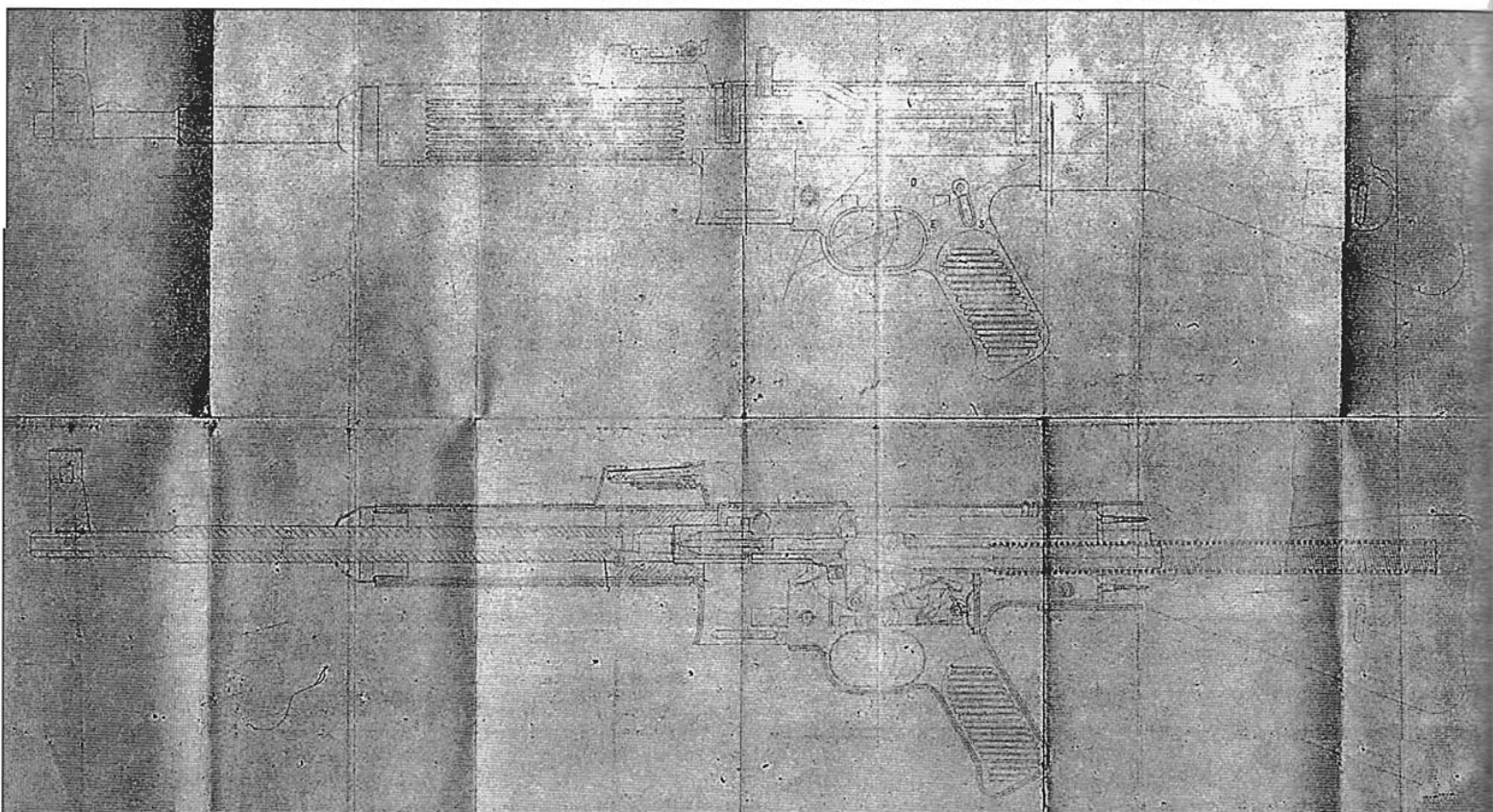
### Dr Maier Comments on Progress to Date

Further excerpts from Dr Maier's 1996 letter to John McCabe read as follows:

*. . . At Mauser, the design efforts on the retarded blowback system had started in January, 1944 and some firing models of the Gerät 06H were available in the summer of 1944. In these designs, especially the angle on the steering piece was varied from 15°*

*to 45° and the unlocking angle in receiver varied from 45° to 60°. Furthermore, the weight of the bolt carrier was increased in relation to that of the bolt head. Also the sheet metal receiver was modified in various ways. Therefore, the models designated 06H are not a definite single design, but a family of various design combinations . . .*

## The First Variant of the *Gerät* 06H



30. Mauser production drawing no V17298B dated 1944, titled *Gerät* 06H.

As discussed in the text, this drawing depicts some distinctive features of the initial variant of the *Gerät* 06H, including the angled cocking handle.

courtesy Reiner Herrmann

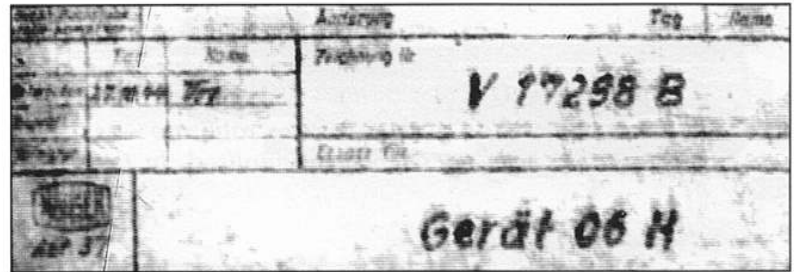
The modifications mentioned by Dr Maier were introduced over time, and interestingly, these resulted in the production of at least two main variants of the *Gerät* 06H. Unfortunately no complete specimen of the initial model remains, but an overall drawing does exist, and at least one set of receiver pressings from this early version has survived.

The drawing, no V17298 B, is shown in fig 30. It depicts two overall left side views, one of the outside of the arm, above, and a vertical cross section, below. While the drawing is unfortunately rather the worse for wear, in the upper view it can be seen that the cocking handle protrudes at a 45° angle above the horizontal, exactly like the handle of the earlier *Gerät*



06, and the cocking handle slot in the receiver pressing is correspondingly located. The stock, however, is slightly different from the Gerät 06 stock, in that it flares gently upward at the butt, giving it somewhat of a paddle shape.

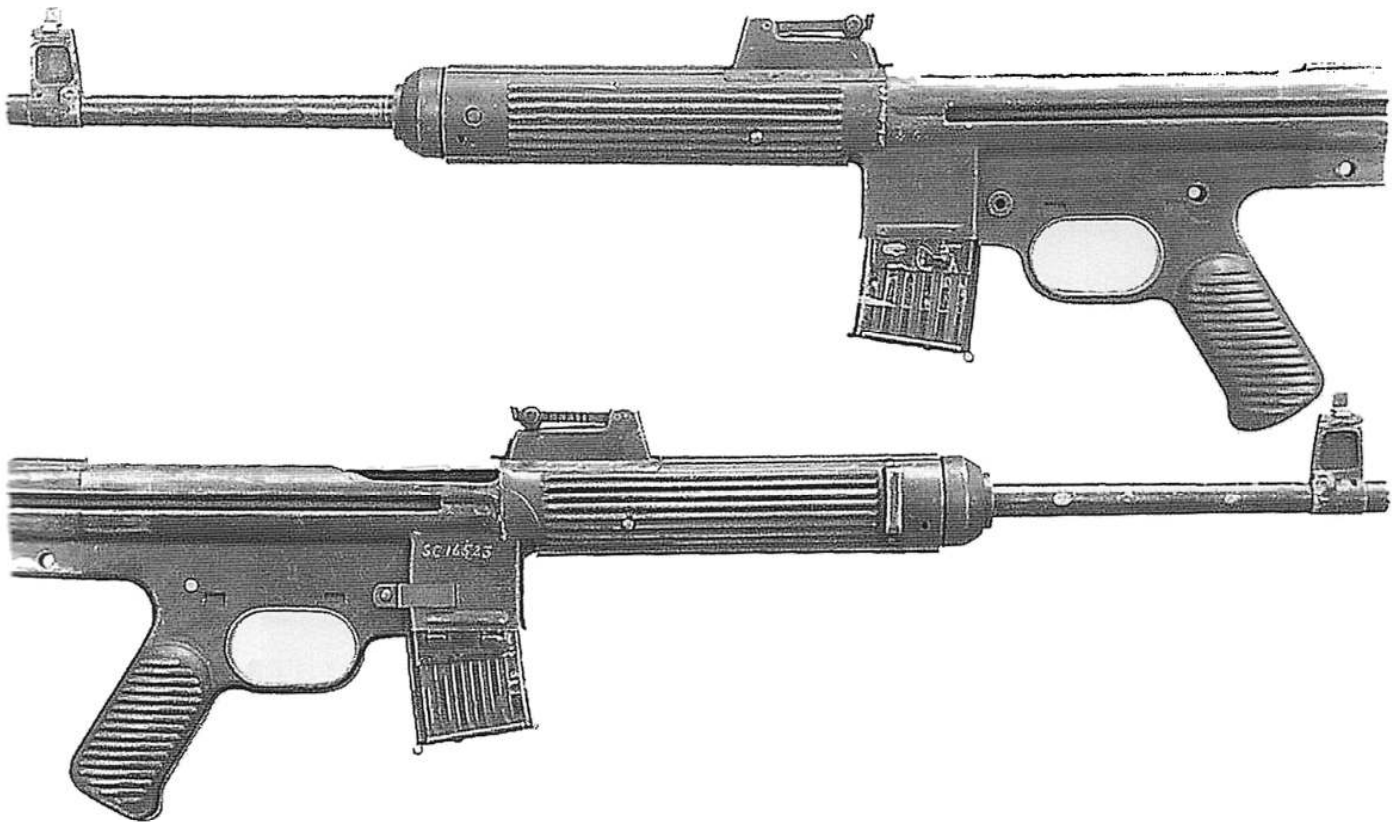
The day and year in the title block read "27" and "44", but the month is illegible. It is assumed however that the drawing predates the drawing no V17315 U2 shown in fig 33, which is dated October 5, 1944 and depicts the bolt carrier and *Steuerstück* assembly with the hole for the cocking handle drilled horizontally.



31. Closeup of the title block from Mauser drawing V17298B, depicted in fig 30.

The month shown is illegible, but is presumably prior to October, 1944, as fig 33, dated October 5, shows the redesigned *Steuerstück* assembly with the later type horizontal cocking handle hole. courtesy Reiner Herrmann

**Aktennotiz Nr 3744**  
**Monthly Report for September, 1944**



32. Left and right side views of an incomplete parts set from an early *Gerät 06H.*, the only actual components from the initial version known to exist.

Note the high receiver wall in the left side view, above,

indicating that this arm was intended to be fitted with a bolt assembly having the early angled cocking handle as shown in fig 26. Canadian War Museum collection,

courtesy Phil White

**V.5823: MP for the MP43 Cartridge, on the unlocked system**

*The investigation of the extractor ratio has still not been concluded. The weapon itself is being revised once more, re material and saving of time in construction. The redesigned individual components are being fabricated.*

**M.7055: Self-loader, Model 03 (Walther with Mauser lock)**

*A further prototype design, with strengthened action, is being made. It is being attempted to complete it by the meeting of the SKInfWaffen on October 19, 1944.*

**M.7066: Locked MP (i.e. Assault Rifle)**

The investigations re the extractor ratio are - as mentioned in V.5823 - not yet finalised. In the

meantime the prototype, once again, will be tested and improved in regard to production techniques.

**Aktennotiz Nr 3779**

**Monthly Report for October, 1944**

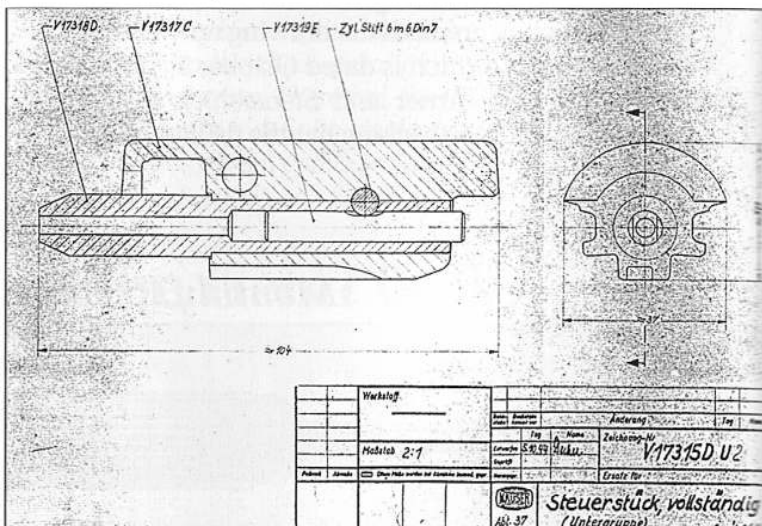
**V.5823, V.5911: MP for the MP43 Cartridge, on the unlocked system**

At the last sitting of the SKInfWaffen this project was placed in the group of "revolutionary" developments. The competition with the MP44 has therefore been made more difficult, [in] that a series of production technique improvements are being tried [for the MP44]. A new model, with an even yet more usefully-shaped housing, should be submitted for the next meeting of the SKInfWaffen, [scheduled for] December 12 and 13.

The experimental weapon submitted was placed before the learned Investigations Department on October 21. The clarification of the extractor ratio is therefore awaited, at the beginning of November.

**M.7055: Self-loader, Model 03 (Walther with Mauser lock)**

The model mentioned in the previous report was submitted to the last sitting of the SKInfWaffen. The Main Committee for Weapons [HAW] wish for no alteration to the production schedule of the original Walther S/L rifle K43, because otherwise the numbers being produced will fall. In spite of this, the SKInfWaffen and WaPrüf2 want the development terminated, and a test carried out. Then the Mauser design should be available as a ready-made solution. At the present time, current produc-



33. Mauser Gerät 06H production drawing no V17315D U2 dated October 5, 1944, titled *Steuerstück, vollständig* (Steering piece, sub-assembly), showing the hole for the cocking handle drilled horizontally.

courtesy Walter Schmid

tion figures are lagging - the new construction itself, with the simplified lock, can follow more quickly.

**M.7066: Locked MP (i.e. Assault Rifle)**

The position of the work is unchanged.

**The End of the Road for the "G44(M)"**

At the SKInfWaffen third (and penultimate) meeting, which was held at the Gustloff factory in Weimar on October 31 and November 1, 1944, all Class III, and some Class II projects, were cancelled. This meant

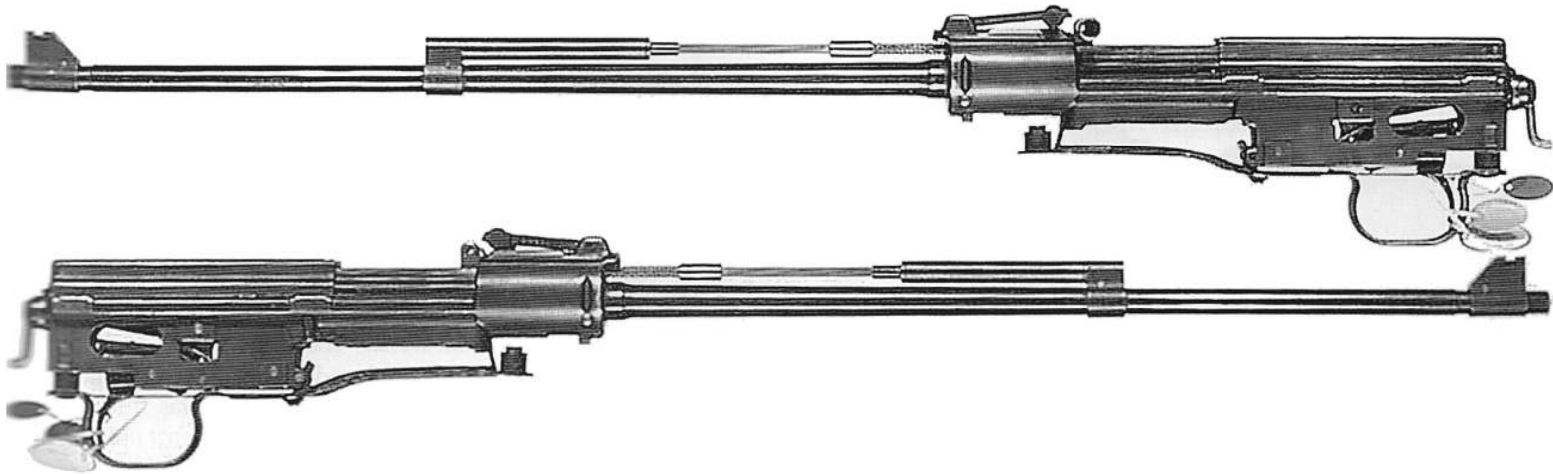
the end of official sanction for the adaptations of the Mauser roller locking system to the full-power Walther G43.

**Ott von Lossnitzer Sums Up the "G44(M)"**

In his hitherto unpublished history of Mauser Werke, Director von Lossnitzer presented his somewhat skewed "view from the top" concerning the application of the Mauser roller lock to the Walther K43, as follows:

. . . we tried to apply the useful and novel [roller lock] mechanism to another weapon type, the

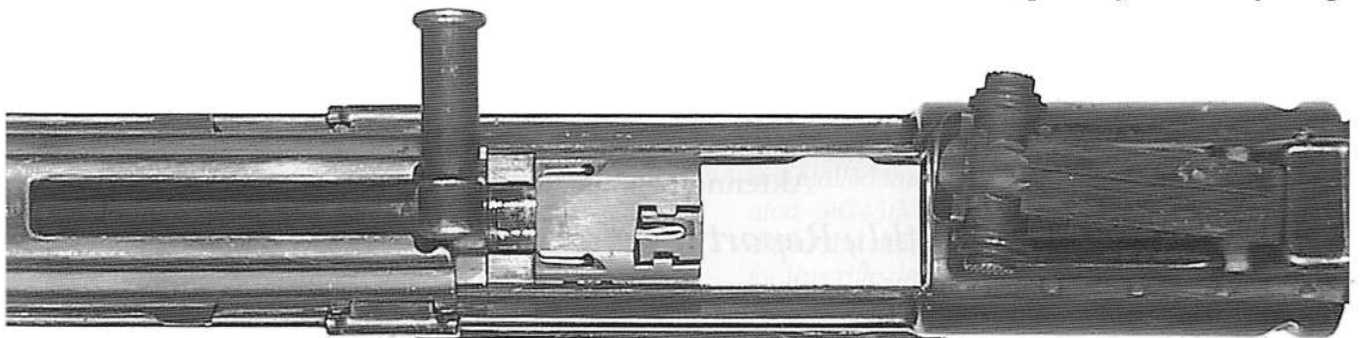
self-loading rifle, designed for the German standard 7.92mm military cartridge. The weapon received the designation G44(M), and was supposed to supersede the Walther K43. Like the assault rifle, the locking device consisted of two vertical rollers. However the rear part of the bolt was moved by a small gas piston which was attached on the top, and connected to a very small gas tube similar to



34. Left and right side views of an incomplete gas-operated *Gerät 03*. All work on the adaptations of the Mauser roller locking system to the full-power Walther G43 was can-

celled by order of the SKInfWaffen at its third meeting, held at the Gustloff factory in Weimar on October 31 and November 1, 1944.

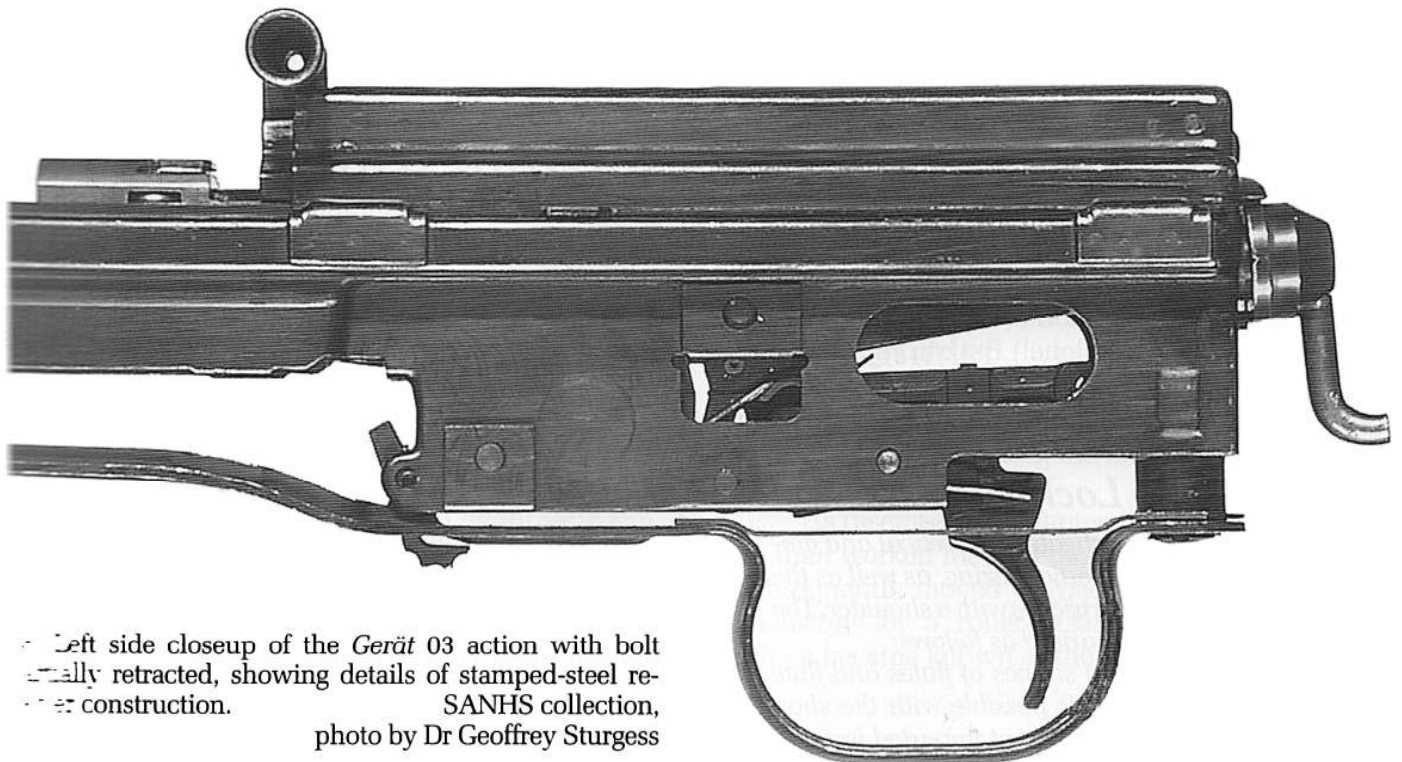
SANHS collection, photo by Dr Geoffrey Sturgess



35. Top closeup of the *Gerät 03* shown above, with bolt partially retracted.

The rear sight has seen a hard knock or two, and is misaligned on its stamped base.

SANHS collection, photo by Dr Geoffrey Sturgess



Left side closeup of the *Gerät 03* action with bolt partially retracted, showing details of stamped-steel receiver construction.

SANHS collection,  
photo by Dr Geoffrey Sturgess



37. Right side view of an incomplete Gerät 07, von Lossnitzer's "final solution", known at the factory as the G44(M). This arm was looted from the Mauser factory by the French, and is now held in a French military museum.

Note the lower profile of the handguard, compared to that shown in fig 12, indicating that this arm was fitted with the semi-rigid roller locking system of the Gerät 06H, and thus had no gas system. courtesy Jean Huon

*the Russian design. The automatic rifle was fed by a 10-round magazine which was inserted under the bolt of the rifle. The new G44 Mauser was much lighter than the K43. The design was simplified and many stamped sheet metal parts were used. The rifle functioned very well, and the German Ordnance Department was quite satisfied with its re-*

*liability. But then came the big disappointment. The German combat units preferred the StG44 as the exclusive infantry weapon, and nobody wanted a new rifle because the short assault rifle fulfilled all the demands of the troops. So the new automatic rifle design was shelved late in the war . . .*

#### Aktennotiz Nr 3816

### Monthly Report for November, 1944

**V.5823, V.5911: MP for the MP43 cartridge, on the unlocked system**

*Towards the end of November - following the delivery of the new pressed steel housing - the assembly work will immediately be taken in hand.*

**M.7055: Self-loader, Model 03 (Walther with Mauser lock)**

*Due to the lack of working personnel at the time of this report, no more hurried work was carried out on this project.*

**M.7066: Locked MP (i.e. Assault Rifle)**

*The new pressed steel housing has still not been completed. In addition to that the official expert was called up into the Volkssturm. The position of the work is therefore unchanged.*

## Vindication for the Half-Locked Roller System

Several ongoing issues of considerable importance were discussed at a high-level meeting held at the Mauser factory in Oberndorf on November 24, 1944. Present were *Oberst* (Colonel) Butz from the OKW, *Dipl Ing* Eckart and *Dipl Ing* Appelt from *WaPrüf2*, as

well as Director von Lossnitzer, Dr Lau, *Ing* Fläming, *Ing* Kunert and Director Niemann from Mauser.

An excerpt from the report of this meeting, signed by Director Niemann, is as follows:

#### Aktennotiz Nr 3799

### Inertia Locking, Case Head Projection and Imparted Impulse

*The Mauser firm investigated theoretical and empirical conditions of inertia locking, as well as the semi-locked bolt for cartridges with a shoulder. The results . . . are summarised as follows:*

*By selection of fixed shapes of flutes and flute spaces in chambers it is possible with the short cartridge to achieve a constant imparted impulse*

*to the bolt, so that even [under] the most unfavourable conditions . . . a sufficiently regular weapon functioning can be achieved. Damage to the cartridge cases with longitudinal or diagonal tears still appear, due to inadmissible stretching. Repositioning of the [angle of] the shoulder and the correct selection of the block, to whatever extent this is*

required on other grounds, is not to be anticipated. At the present time, favourable production techniques for this kind of cartridge chamber are being investigated. A transference of the results to the rifle

cartridge appear - after the previous trials in the field - completely likely. The corresponding trial item is being constructed . . .

#### Aktennotiz Nr 3838

### Monthly Report for December, 1944

#### M.7066: Locked MP (i.e. Assault Rifle)

The position of the work is unchanged, because the new pressed housings are still not ready.

#### V.5823, V.5911: MP on the unlocked system (Sturm-gewehr)

The newly made model has been placed before WaPrüf2/I. The reception was good. At present it is

being revised once more. During January the competing firms of Grossfuss and Rheinmetall-Borsig will submit their models. Haenel also have recently taken part in this project. By the end of January, 1945, the Mauser prototype will be completed, at the required time set by the Ordnance Office.

## The Gerät 06H Becomes the StG45(M)

Dr Maier's 1996 letter to John McCabe continues:

. . . In August 1944, after some test firings, the feasibility of the retarded blowback system was proven and this project was listed by the SKInf-Waffen among "the most revolutionary design ideas". In the late fall of 1944, the Heereswaffenamt decided on a definite combination of de-

sign parameters; i.e., a single, well-defined design, selected after the firing tests. This single design was now called the Mauser Sturmgewehr 45, abbreviated StG45(M). The Heereswaffenamt also ordered the manufacture of 30 sets of components for this rifle design.

## The Roller-Locked MG215

In a parallel development, a flexible aircraft gun, eventually known as the MG215, was developed using the gas-operated *Starrverriegelt* (fully-locked) roller action, like the *Gerät* 03 and 06, but utilising an annular or "doughnut" type of gas piston, like the Walther Mkb42(W).

In his June, 1993 memorandum, quoted above, Dr Maier commented that Ludwig Vorgrimler had reported to him in January, 1944 that "Mr Altenbur-

ger gave him the order to design a HEAVY MG based on the semi-rigid roller breech mechanism". This was a reference to a brief period of experimentation during the last months of the war, when an attempt was made to incorporate a half-locked roller system into the existing MG215. As described below, this attempt was inconclusive within the time available, and no heavy machine gun is known to have been fully developed using the half-locked roller system.

### Introducing Ludwig Vorgrimler

Ludwig Vorgrimler was born on September 7, 1912 in Freiburg. He worked briefly as an engineer at the Schupp factory from January 1 to November 1, 1936, and was then persuaded by Ott von Lossnitzer to join Mauser Werke from that date until August 15, 1945. His last position with Mauser was in Altenburger's Department 37, *Konstruktion und Werkstatt für leichte Waffnaraffen* (Construction office and workshop for light military weapons up to 15mm), where he was

responsible for the design and development of aircraft weapons, including the late-war MG215, summarised below.

As discussed in Chapters Seven through Nine, he then worked for the French DEFA at CEAM, and subsequently moved to Madrid, where he was responsible for a roller-locked assault rifle design which became known as the CETME (Chapter Ten).

## The “*Flieger-Bord MG mit Walzenverschluss*”

As early as 1941 the *Luftwaffe* had issued an operational requirement for a higher rate of fire and muzzle velocity from the MG131 aircraft machine gun. Developments were accordingly undertaken by Rheinmetall and Krieghoff, and Mauser also launched a private internal investigation. The first mention of this in the Mauser monthly reports is from December, 1943 *Aktennotiz*, which reads as follows:

*Aircraft MG with roller locking (system)*

*The design of an aircraft MG based around the roller locking system, is nearly 40% completed.*

The entry under the main heading “Review of our own new developments” for the following month, January, 1944, reads as follows:

*Aircraft 13mm with roller-locking system*

*The diagrammatic model, which does not take the [MG] 131 cartridge, is about 95% completed. A wooden model of the project is being made.*

Under the heading “Review of current and newly granted orders” the February, 1944 *Aktennotiz* discusses ongoing work being done on several aircraft machine guns of different designs, including the MG213, originated on March 18, 1943; the MG213A (wedge locking system), in which “experimental weapons V6 and V7 were ready for their endurance trial shoot at the beginning of February, experimental weapon V8 is still being assembled”; the MG213C (Revolver principle), wherein four prototypes, V1 through V4, were in the works; and a new MK214 (MK—*Maschinenkanone*—was the new nomenclature established in 1944 for machine guns of 20mm or higher calibre).

In this February, 1944 internal report the designation “MG215” is mentioned for the first time, as follows:

*New development MG215, (formerly our own development of a 13mm aircraft MG with roller locking system)*

*This is a follow-up project, of our own firm’s former development, which has been transferred to an [Ordnance] Office order, after an announcement by the Head of the Acceptance Inspectorate Department of the Air Ministry.*

*The diagrammatic development has been completed, as well as a wooden model of the weapon. A start has been made with the production of parts. A parallel development is proceeding at the firm of Stübgen of Erfurt. As far as is known, this firm is about to carry out firing trials in about a month’s time; it is mentioned as having an MV of 1,000 metres per second [3,281 fps], and a rate of fire [between] 1,200 and 1,400 rpm.*

Two entries for the MG215 appear in the March, 1944 *Aktennotiz*, as follows:

*New development MG215*

*The individual parts drawings are 95% completed, the work in the Workshop has advanced to the point where the first prototype will be ready on March 20. A recoil mechanism is in the development stage . . .*

*Infantry mounting for the MG215*

*Army High Command (WaPrüf2) have shown interest in establishing [the use of] the MG215 for ground combat [purposes], therefore we have started with the design of a wheeled mounting for this weapon.*

## MG215 Versatility Revealed

A two-day conference on the MG215 was held at the Mauser factory in Oberndorf on March 24 and 25, 1944. The Secret report of the minutes of this meet-

ing, translated by the late Jim Stonley, reads as follows:

*Present:*

*Flight (Staff) Engineer Bühler, Air Ministry, GL/C-E6*

*Flight Engineer, Captain Busche, Acceptance Inspector, Mauser*

*Director von Lossnitzer (part time), Mauser*

*Chief Engineer Altenburger (part time), Mauser*

*Engineer Vorgrimler (part time), Mauser*

The Mauser firm, on its own initiative, has undertaken the development of a 13mm MG. The MG was - in the first instance - to be built for the present 13mm cartridge for the MG131. The firm has in doing so covered the following proposals:

1. The development of a 13mm MG as a replacement for the MG131, with special value being placed on the most modern and most simple production, and thereby a considerable saving - of production time as well as gross weight of material - will be achieved. The firm will carry out a pre-estimate in regard to the production time and raw material requirements.
2. Exclusively non-essential material will be used for this MG.
3. The MG should be so built that it can be installed in the present mounting for the MG131 without any alteration whatsoever, provided that the proposed high rate of fire of 1,200 to 1,400 rpm can be taken up by the present recoil mechanism.  
In case this is not possible the braking movement must be altered.
4. The present remote control working of the MG131 shall also be used for the new MG.

#### **Position of the Development**

The design for the MG has in the main been completed. An initial prototype has already been presented and is undergoing firing trials. Functioning [in the installation] is to be carried out after the present first experiments. Two further MGs are still being assembled.

#### **Further development of the 13mm Mauser aircraft MG**

The MG is to have the designation MG215.

A further development of the MG215 for the MG131 cartridge is no longer of interest because the performance of the cartridge is insufficient. Already for a fairly long time, an order has been given from GL/C-E6 for a greatly improved cartridge to be developed. Muzzle velocity = 1,000 metres per second [3,280 fps].

It was decided that the MG215 will be developed for this new cartridge. The following requirements are to be demanded of the MG215:

1. Use of a cartridge with muzzle velocity of 1,000 m/s.
2. Minimum rate of fire of 1,000 rpm.
3. The belt pull must be at least two metres for 1,000 rpm.
4. The major parts of the weapon will be required to have a working life of 10,000 rounds. Up to 5,000 rounds possibly no small parts should break, and possibly no troubles - due to loading - should occur.
5. The cartridge will be required to have electrical ignition.
6. ED [Electrical Device] 131 and EA 131, as well as the [compressed] air cocking, and MA 131 must be able to be used. Also investigations must be made whether the use of the present hand cocking arrangement is possible for the MG215 if - in the present mounting - the cocking of the Mauser [MG] is not possible by the hand cocking arrangement provided, due to shortage of space.
7. For manual use of the MG215, a pistol grip with trigger is requested.
8. The installation in the present MG131 mounting, with the possibility of the greatest alterations to the recoil mechanism, and to the belt feed (ammunition box and feeding tube) - are to be accepted.
9. The operation of the weapon is to be guaranteed at an increase +/- 90°, as well as in all positions which arise when the MG is turned about the barrel axis.
10. Operation from temperatures -60° to +80°C is to be guaranteed.
11. The greatest possible insensitivity to fouling.
12. It is proposed [the MG is] to be provided with a muzzle flash eliminator [so that] complete elimination will result in night-fighting.
13. It is to be investigated whether a possible necessary alteration can be avoided to the recoil mechanism, through the use of a muzzle brake.

*In order to check the possibility of installation into the present mounting as quickly as possible, it will be attempted by GL/C-E6 to produce as many various MG131 mountings as possible [for despatch] to Oberndorf. In addition Mauser must construct about 10 wooden MG215 dummies, for the carrying out of investigations into installation.*

***Progress of the Development***

*Because the conversion from the MG131 cartridge to the MG215 for the high performance cartridge requires no important redesign, the first MG215 for the high performance cartridge will be produced about the middle of May.*

*By that time further trials will have been carried out with the present three MGs for the standard cartridge, in order to accumulate as much practical experience as possible.*

*In the interest of a quick carrying through of the development of the MG215, already now a total of ten weapons must be placed on order with the aim to have - in connection with the production of the first weapon in the shortest possible time - further weapons for presentation, which are to be provided for the carrying out of trials by the Firm on a larger basis, and for testing. It is necessary that the working on the MG215 will be pushed forward with the greatest possible urgency, [and] GL/C-E6 will attempt to accomplish the highest possible grade of priority for the development of this equipment.*

*For the manufacture of the first prototype belt feed [i.e. links], GL/C-E6 will arrange for the Mauser firm to give assistance to the Ruberg & Renner firm in Saxony.*

*The Mauser firm will obtain, as soon as possible, a preliminary decree [from the Special Committee] on the development of the MG215 for the high performance cartridge on the basis of the proposed design by Mauser, as well as on the production of ten prototypes, including the development of the total accessories, as well as carrying out the necessary investigations and trials.*

*Already the supply of further ammunition has begun from GL/C-E6. It is therefore to be reckoned that 5,000 rounds will be submitted in 4 to 5 weeks' time. Preparation of further ammunition can then concurrently follow. Mauser will report about the following requirements for the total trials of about 60,000 rounds, and will require*

- on May 1, 1944, at least 5,000 rounds;
- on May 15, 1944, at least 10,000 rounds;
- on June 1, 1944, at least 20,000 rounds; and
- on July 1, 1944, the rest of 25,000 rounds.

*These times will be the arrival dates at Mauser, Oberndorf.*

*For GL/C-E6  
[signed] Bühler*

*For Mauser  
[signed] von Lossnitzer*

As confirmed in the April, 1944 Mauser internal report, the first firing model had been made available:

***New development MG215 (SS 5600-0004/44 of April 22, 1944)***

*A weapon was fired, in automatic fire, before the Special Committee for Automatic Cannon on April 13, 1944 at Unterlüss. The Committee has made a*

*decision to close down the concurrent developments, and to carry on further with the Mauser design. The development is 85% completed for the high-performance cartridge; 65% of all parts are being made in the Workshop for the construction of the first prototype.*

## Further MG215 Conferences

Further conferences were held at Berlin and Unterlüss on the 13th and 15th of April, 1944, "concerning the ammunition for, and the weapon, MG215". Larger, more powerful 20mm and 30mm aircraft cannon were being mandated for almost all German

aircraft installations by 1944, and this memorandum is the first to point out what Dr Geoffrey Sturgess calls the "continually moving target of Luftwaffe specifications", which resulted in each successive iteration



of the MG215 becoming obsolete before it could get into production.

A translation by the late Jim Stonley of the Secret report of these meetings reads as follows:

**Present:**

*Herr Wing Cmdr Dr Franz (part time)- GL/C-E6V*

*Herr Wing Cmdr Bühler (part time) - GL/C-E6*

*Herr Wing Cmdr Lehmann (part time) - GL/C Production VI*

*Herr Squadron Ldr Roth (part time) - GL/C-E6I*

*Herr Squadron Ldr Gunther (part time) - GL/C-E6V*

*Herr Dr Grasse (part time) - Rheinmetall firm*

*Herr Director Niemann (part time) - Mauser Works firm*

Note: The comments provided under + to the individual points of the conference are inserted additionally, on the basis of subsequent conferences and considerations. It is requested that this is recognised.

1. + *The MG215 is fired with the same projectiles as with the MG131, that is Incendiary and AP ammunition.*
2. *The MG131 has a [rifling] twist of 8° 30'. This is completely adequate for the MG131, with 750 m/s muzzle velocity for external ballistics, also with deflection shooting and firing forward from fighter aircraft.*  
*The rifling twist at the time was so completely regulated that not only GL/C-6V, but also the [Rheinmetall Borsig] firm were of the opinion that this twist was also completely adequate for the increased velocity off 1,000 m/s for the MG215.*  
*Indeed trials were not carried out, yet an increase of the twist of the MG215 was not necessary.*  
*As soon as the first weapons are placed at their disposal, a flight trial will be carried out.*
3. *The fuses of the Incendiary ammunition are relatively simply constructed. Although the fuses have no mechanical destruction the twist of the projectile at the muzzle is equally valid for the destruction operation. The pre-barrel safety is likewise not dependent on the number of turns of the fuse.*
4. *The Mauser firm should - from the first - decide the most favourable internal arrangements (i.e. barrel twist, etc) - owing to the high ballistic performance and the high rate of fire - by which a higher rate of barrel wear is to be expected - after the experiences gained with the remaining weapon; and all barrels for weapons, proof equipment and gas pressure measurements - from the first - should be equipped with the most modern internal arrangements.*  
*First of all, it should be tried, without giving rise to internal chroming - however two internally chromed barrels are to be manufactured immediately for investigative purposes. The order from the Air Ministry of the 21st of April, 1943, with the Office Nr SS 5615-5334 (2276\_Az72d/43 (C - B 6 IIB) re ten gas pressure measuring (barrels) with altogether thirty barrels are - so far as this is possible - to be given the new barrel internal arrangements. Already-constructed barrels were delivered in the earlier shape, with a constant rifling twist of 8° 30'. These barrels were later exchanged.*
5. *The ammunition development firm is RWS at Nuremberg. There lie [at this place] all the earlier experiences with this ammunition, previous designation MG110.*  
*Although the development of the primer Sp1 is still to reach its successful conclusion shortly, the ammunition should be made available - possibly from the first firing trial with the MG215 - or if this is not possible, to be equipped as soon as possible with the Sp1 primer in its latest form (with all improvements as are laid down in the Electrical Primer Document Nr 21).*

+The DWM firm will immediately place the drawing particulars at the disposal of the RWS firm. The number of items and final date of delivery will be agreed amongst RWS and DWM Grötzingen, Herr Dr Scholz - with the agreement of the Procurement and Development Offices of the Air Ministry.

Should it not be possible for the first ammunition to be used with the Sp1 primer; the P2 primer will still be used for the time being.

6. Although HE projectiles are not to be provided for the MG215 - the production of these projectiles was in the meantime discontinued - and because the present stock [handwritten note: "of 'M' projectiles"] has not to be used at all in the MG215 under any circumstances; it has been decided that the barrel for the MG215 is not required to be safe for HE rounds.

Its dimensions thus agree exclusively with the standard demands of durability, capacity for heat, [barrel] life, and adaptation demands. First of all the barrel is to be constructed from non-essential materials. It is to be tried with SM quality, or if possible to get away with Thomas quality. [Handwritten note: "Overtaken by 15mm" initialled by Bühler].

7. +Although the MG is to be used not only by the Luftwaffe, but also by the Navy and the Army, the ammunition, as well as being arranged for electrical ignition, must also be arranged for mechanical primers. The development of the electrical ammunition is to be given first place, in regard to the urgent demands of the Luftwaffe.

In this connection it was determined that the development of the mechanical primers for this ammunition, is to follow in co-operation with the development of the new mechanical primers for the 2cm ammunition. It is to be striven for that both primer developments are to be standardised. It is to be investigated whether it is possible or not, to create a primer, that although mechanical can also serve as electrical. A primer of this type would be feasible for the universal ammunition for the Air Force, Navy and Army. The cartridge cases, first of all, should only have a single centrally punched flash-hole.

For GL/C-E6V  
[signed] Bühler

For Mauser Works  
[signed] Niemann

[Handwritten note: "[This] document has been overtaken by the delivery of the 15mm calibre [ammunition] for the MG215."

[signed] Bühler

By May, 1944 the Mauser internal monthly report recorded that the MG215 project had been assigned an official "V" contract number, as follows:

#### V.7077 MG215

The construction drawings have been completed, Complete sets of parts for a few test models, ordered by [WaPrüf2], are being produced.

## The MG215 in the First of Two Rechamberings

As noted above, the MG215 had initially been chambered for the standard 13x64B MG131 cartridge, which produced a muzzle velocity of 790m/sec (2,592 fps). The development which followed was of a second version chambered for the high-performance 13mm cartridge featuring an enlarged 13x92B case fitted with the same 34g (525 gr) bullet, which produced a firing rate of 1,000+ rpm at a muzzle velocity of 960m/sec (3,150 fps). (As noted above by Bühler, however, this new development was itself

later superseded by a second rechambering, in 15mm.)

Nevertheless, the Mauser monthly report for June, 1944 reads as follows:

#### MG215

The first weapon - to take the high performance 13mm cartridge - has been completed. Already firing trials and measurements have been carried out with it. Functioning [trials] at present give a rate of fire of 1,100 rpm. Nine further weapons are in the process of development.

*There is already an ammunition development currently on order, by the authorities, in which the*

*case of the high performance cartridge is being considered for the 15mm projectile.*

## The MG215 is Readied for Mass Production

As recorded in the July, 1944 monthly report,

### MG215

*On the basis of the alteration to the Aircraft Building Programme [and] in consequence of the resolution of the Special Committee for Automatic Cannon, this weapon has been allotted prepara-*

*tory arrangements for mass production. The weapon is completely ready for development as a ready-made solution. Since the last report on this subject, there are still no changes to record, because above all the arrival of the [high-performance 13mm] ammunition is still being awaited.*

## MG215 Production Cancelled by the Special Committee!

The MG215 entry in the August, 1944 monthly report reads as follows:

### MG215

*The position of the development work is unaltered. Because this project was stopped by the Special Committee for Automatic Cannon, only technical measuring investigations are being carried out at the present time. Until delivery of the ammunition, and further cartridge links from the sub-contractor, a duration trial shoot cannot be carried out.*

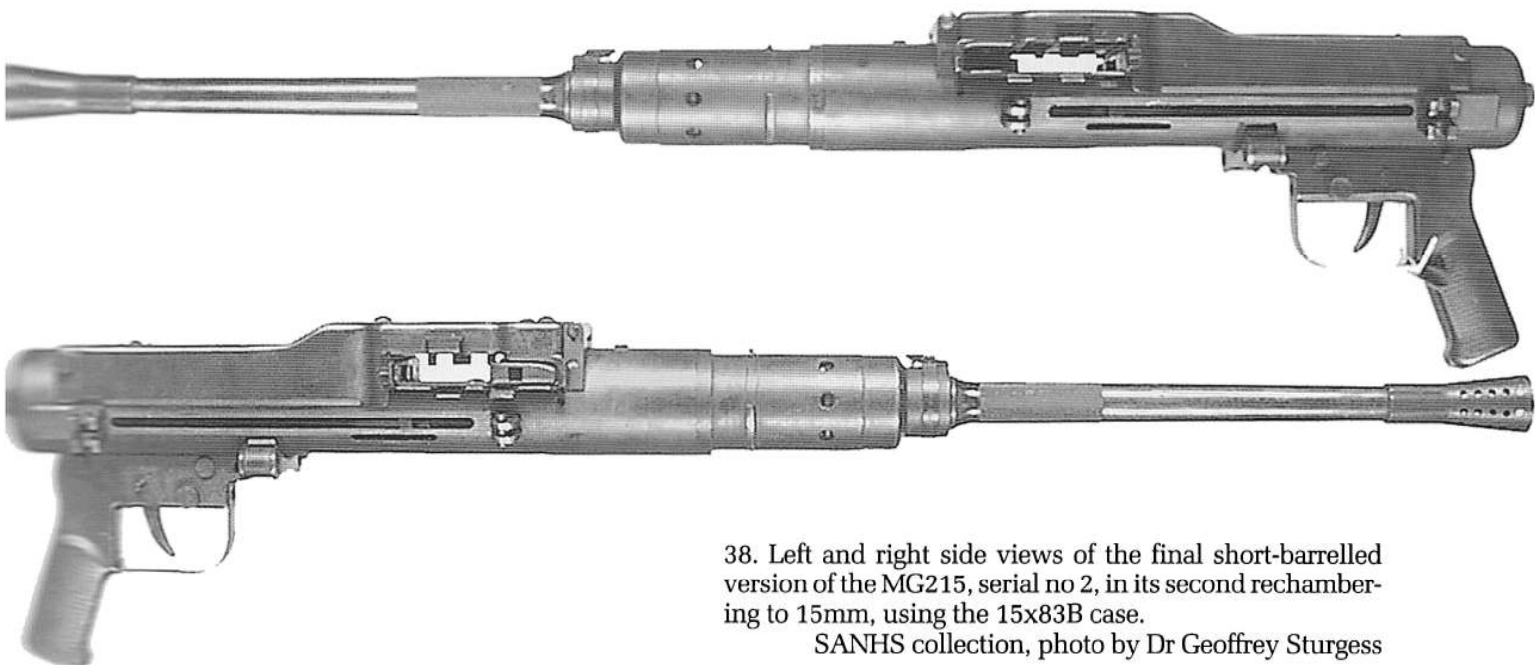
### MG215

*The position of the work is unchanged. To this project will be added the colleagues who have been employed on the Potsdam [German Sten copy] work. In the meantime we have informed the DWM Experimental Establishment, with the approval of the ammunition development section of the Luftwaffe High Command, that the essential ammunition for the testing of the experimental weapon should be completed very soon.*

The September, 1944 monthly report continues as follows:

The October, 1944 report records no further activity on this project, "because no labour force was on hand", and concludes that "The project will probably be taken up again in November."

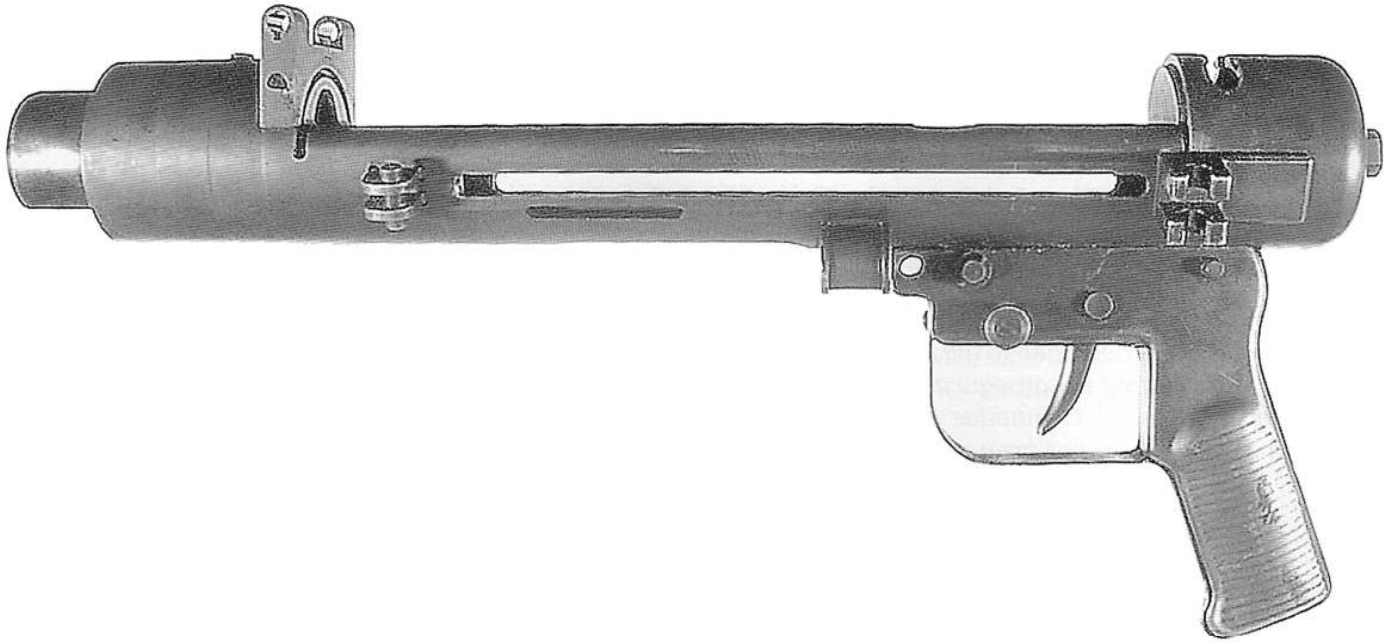
## A Final Rechambering, in 15mm



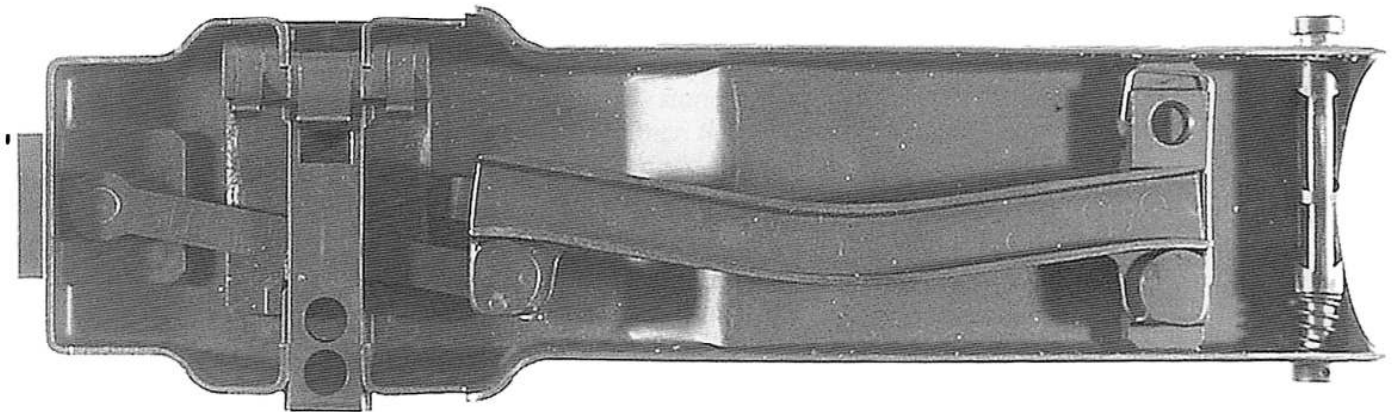
38. Left and right side views of the final short-barrelled version of the MG215, serial no 2, in its second rechambering to 15mm, using the 15x83B case.

SANHS collection, photo by Dr Geoffrey Sturgess

42 A Final Rechambering, in 15mm

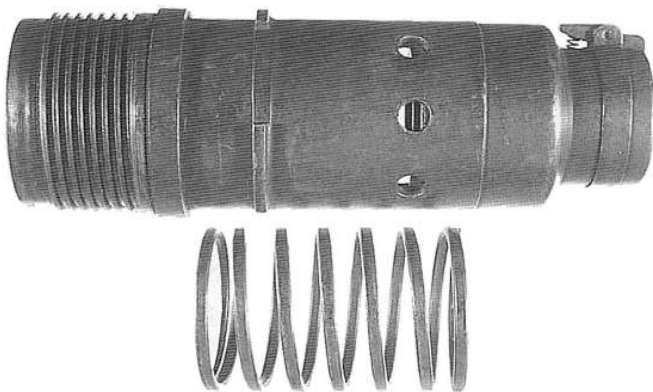


39. Left side view of the receiver of the MG215, with barrel, bolt assembly and top cover removed.  
SANHS collection, photo by Dr Geoffrey Sturgess

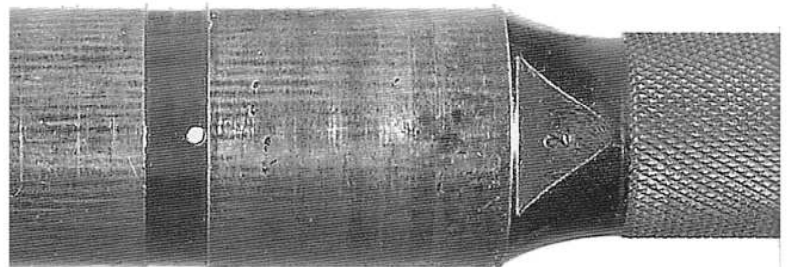


40. Underside view of the top cover of the 15mm MG215, serial no 2.  
The feed arm is configured to produce half the feeding

cycle on each forward and backward stroke of the bolt, giving a smoother action akin to that of the MG42.  
SANHS collection, photo by Dr Geoffrey Sturgess



41. Right side view of the MG215 gas cylinder, above, and the piston return spring, below.  
The annular piston is shown trapped inside the cylinder at the front of the vent holes.  
SANHS collection, photo by Dr Geoffrey Sturgess



42. Closeup of the barrel of the MG215, showing gas port at left and serial number "2" on triangular flat at right.  
SANHS collection, photo by Dr Geoffrey Sturgess

The noted collector and WWII historical researcher Dr Geoffrey Sturgess confirms that at some point there was a second, final rechambering of the MG215 to 15mm, as follows:

... [The high-performance 13mm iteration of the MG215] was followed finally by a 15mm version using the 15x83B case, giving 840m/sec [2,756

fps] at about 1,200 - 1,400 rpm with a 56-grain [847-grain] bullet.

## A Brief History of the "Doughnut" Gas Piston

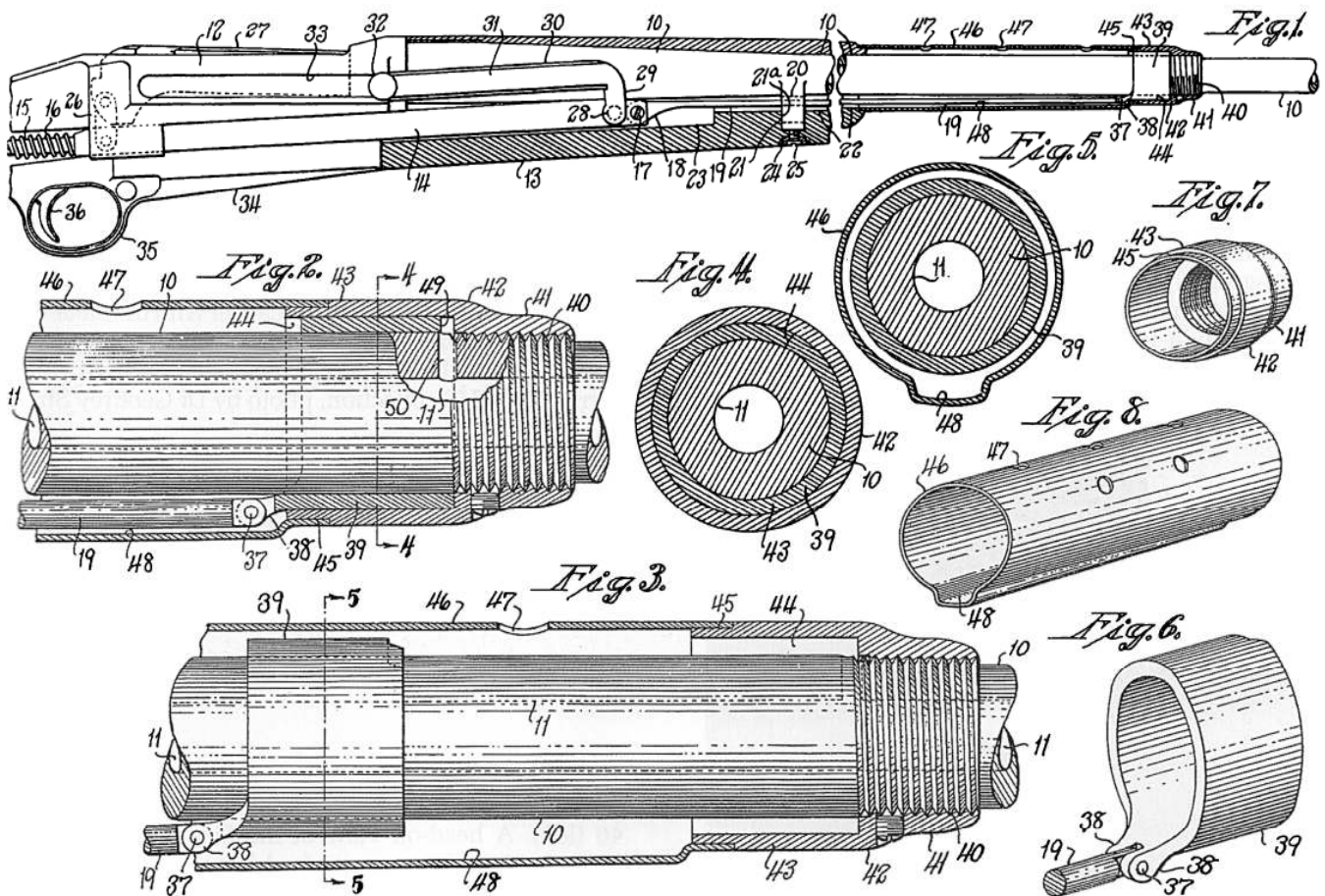
Aug. 19, 1941.

J. E. BROWNING

2,252,754

GAS-OPERATED AUTOMATIC FIREARM

Filed Aug. 31, 1938



43. The sheet of drawings from the disclosure of US patent 2,252,754, titled "Gas-Operated Automatic Firearm", granted to Jonathan E Browning on August 19, 1941.

The rifle depicted was designed by J E Browning, John Moses Browning's half-brother, for US Marine Corps trials in San Diego, California, in 1940. In its original form the rifle was unsuccessful, and it was later redesigned for Winchester by David Marshall Williams, who at this point had not yet acquired his later nickname "Carbine".

The gas system components of interest as antecedents of those used in the Vorgrimler MG215 are numbered and

described as follows:

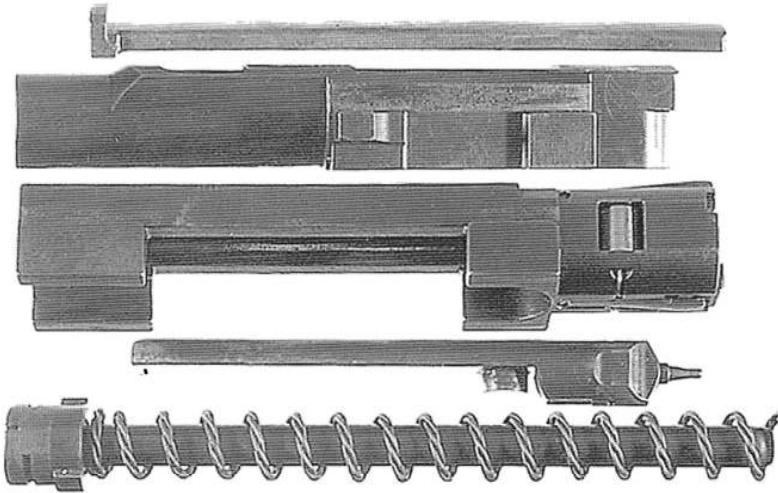
A tubular-piston 39, with bifurcated ears 38 to which is attached the actuating-rod 19. The piston moves within a guard-tube 46, and in its forward position enters the gas chamber 44 of the cylinder 42, where the notch 49 in the piston is aligned with the gas port 50 in the barrel. On firing, gas escapes radially outward through the gas port 50 into the tubular gas chamber 44, resulting in the tubular piston being thrust rearwardly, causing the actuating rod 19, action slide 14, breech bolt 27 and associated parts to be moved rearwardly.

US Patent Office, courtesy James Alley Jr, PhD

Before the Jonathan E Browning patent illustrated above, the "doughnut" gas piston concept was utilized in the short-lived Walther self-loading A115 rifle

series, designed by Karl August Brauning, and in the unsuccessful selective-fire Walther MKb42(W).

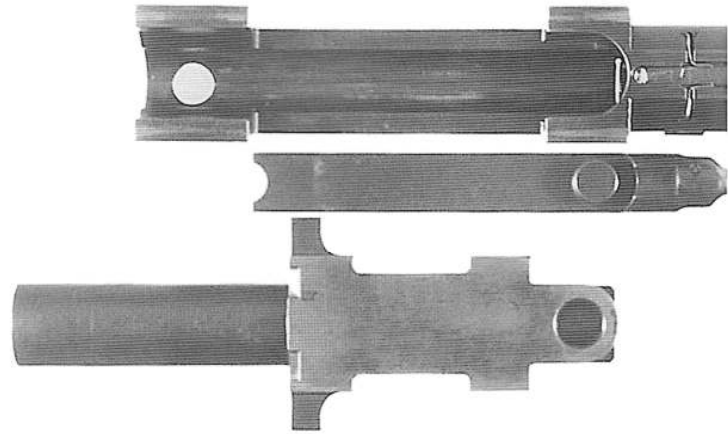
#### 44 Last-Ditch Attempts at a *Half-Locked* MG215



44. Right side view of the components of the bolt group of the 15mm MG215.

From top: the operating slide, which transmits the gas impulse from the “doughnut” gas piston to the bolt carrier; the bolt carrier; the bolt, showing the rollers at right which are quite similar to those used in the assault rifle; the firing pin/*Steuerstück*; the rearmost portion of the return spring and its guide.

When assembled, the bolt carrier fits into the central area of the bolt from below, and carries the *Steuerstück* with it. SANHS collection, photo by Dr Geoffrey Sturgess

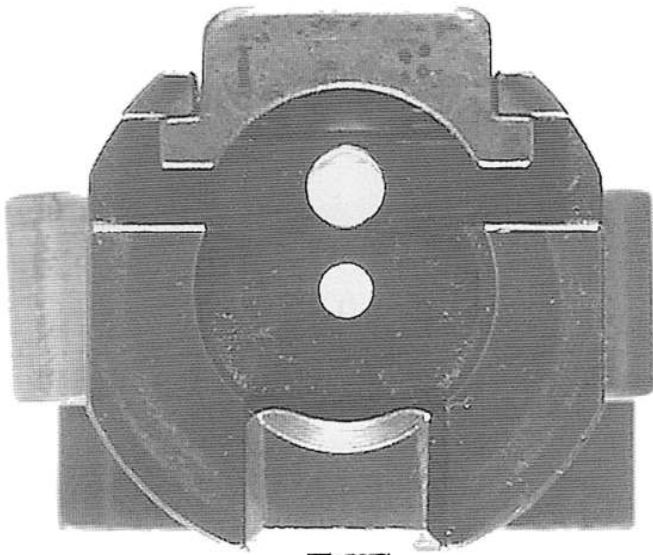


45. Another view of the main bolt components of the MG215.

Above: underside view of the bolt, with rollers withdrawn.

Centre: underside view of the *Steuerstück*/firing pin. Note the parallel sides of the areas which contact the bolt locking rollers.

Below: top view of the bolt carrier, showing locating hole at right which couples the carrier with the *Steuerstück*. The forward portion of the return spring and guide are housed within the rear bored-out tubular portion of the bolt carrier. SANHS collection, photo by Dr Geoffrey Sturgess



46 (left). A head-on view of the face of the bolt of the MG215. Note the separate feed horn, above; the locking rollers, extending on either side; the extractor, below; and the holes for the ejector and firing pin.

SANHS collection, photo by Dr Geoffrey Sturgess

## Last-Ditch Attempts at a *Half-Locked* MG215

The Mauser monthly report for November, 1944 does indeed pick up the project again with an interesting note, as follows:

### *MG215*

*It was attempted to install a half-locked system in this equipment, in order to simplify it even more.*

The December, 1944 report continues the MG215 story with the tantalisingly brief note that “The prototype item for a half-locked roller system is in production”.

The January, 1945 *Aktennotiz* No 3847, the last such document known to exist in the series of Mauser internal monthly reports, records that work was still in progress on the production of a prototype MG215 incorporating a half-locked roller mechanism.

## The CIOS Sums Up the MG215

The CIOS report on the visit to Lager Haiming and the interrogation of Mauser personnel in Oberndorf confirms the above, and sums up the MG215 as follows:

*This weapon has been developed for three types of ammunition. Originally the normal ammunition for the MG131 was used, but the effective range was insufficient and the trajectory not sufficiently flat.*

*It was then decided to increase the weight and velocity of the 13mm projectile, and a muzzle velocity of 1,000 m/sec was obtained. The effect on the target was still considered insufficient. The calibre of the projectile was then increased to 15mm, which proved satisfactory to requirements.*

*The weapon is gas operated, with Mauser pattern cylinder and piston. The piston is mounted around the barrel in the shape of a ring.*

*In concept, the breech block is similar to that of the self-loading rifle [the "G44(M)"].*

*The gun is electrically fired, and incorporates electric loading and extraction devices. The construction of the electric loading and firing is the same as on the MG131, as developed by LGW (Luftfahrtgerätewerk Berlin-Hakenfelde), and the corresponding gear to the MG131 can be used without modification on this gun.*

*In addition to the electrical loading gear a light and simply constructed pneumatic loading device has been incorporated as an alternative.*

*The gun casing is made from sheet steel pressings, and machining is reduced to a minimum.*

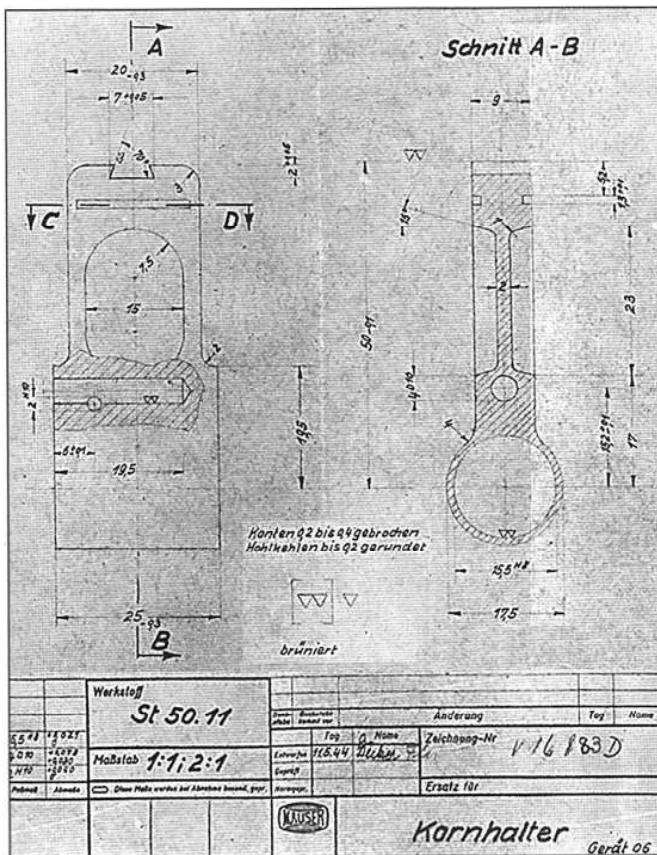
*Belt feed can be from either right or left side as desired, by simple rearrangement of existing components.*

*The rate of fire is from 1,200 - 1,400 rounds per minute.*

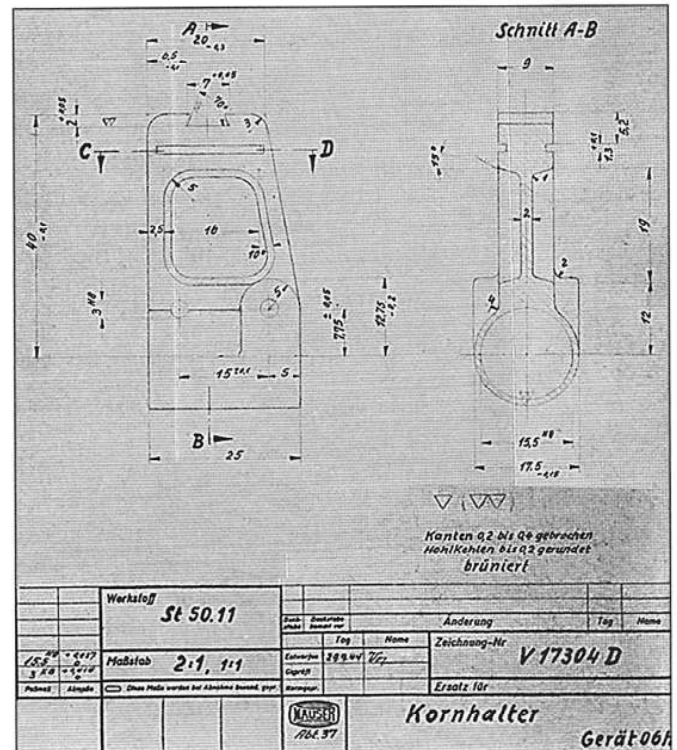
Chapter Three

# 1945: The Last Gasp

## The "New Model" of the *Gerät 06H*



47. Mauser *Gerät 06* production drawing no V16983D dated May 11, 1944, titled *Kornhalter* (front sight base), showing the height of the front sight from the centre of the bore to the base of the sight blade as 50mm (1.97").  
courtesy Walter Schmid

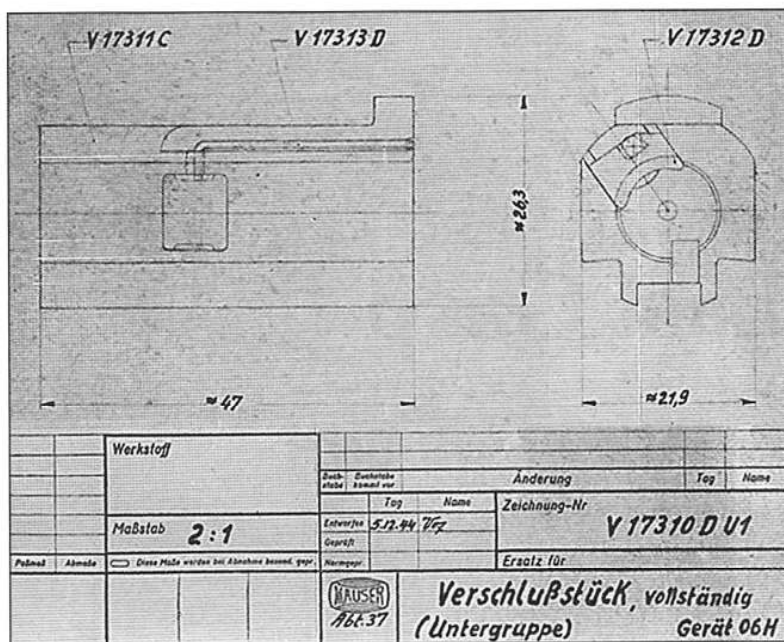


48. Mauser *Gerät 06H* production drawing no V17304D dated September 29, 1944, also titled *Kornhalter* (front sight base), showing the height of the front sight from the centre of the bore to the base of the sight blade reduced to 40mm (1.57").  
courtesy Walter Schmid

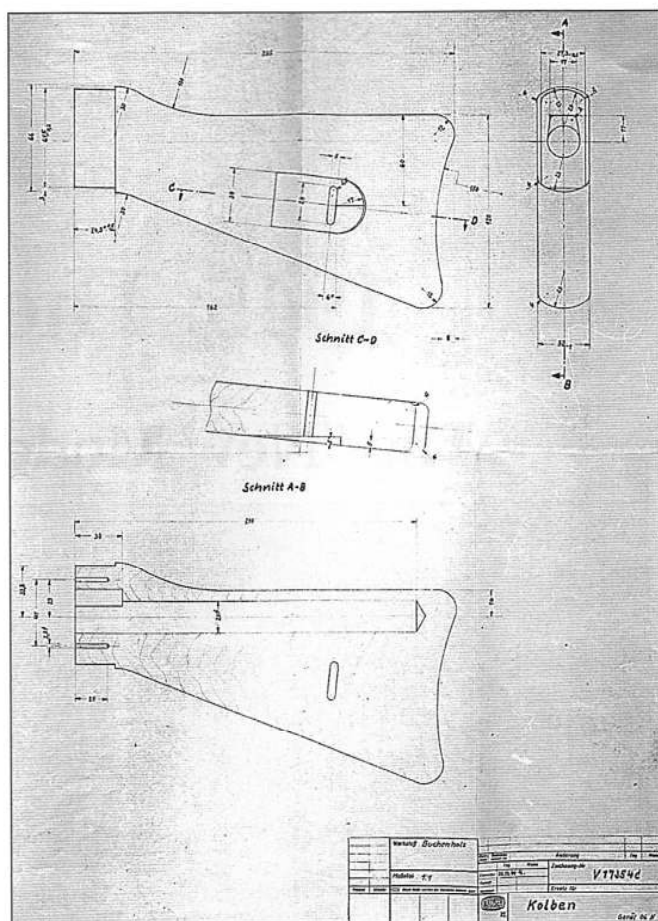
As noted briefly by Dr Maier, the sheet metal receiver of the original version of the *Gerät 06H* was modified "in various ways", so that by the end of 1944 the cocking handle protruded horizontally and the slot in the left side of the receiver pressing was correspondingly lower.

According to the drawings shown above and on the following page, several other changes were also introduced. The height of the sight line above the bore was reduced by 10mm (approximately .4"), from 50mm in the *Gerät 06* to 40mm in the *Gerät 06H*. In addition, the extractor was relocated from the vertical position on the face of the bolt head as shown in the Mauser patent application drawing (fig 85) to an angle of approximately 45° to the right; and the flare at the top rear of the buttstock gave way to a simpler straight comb.





49. Mauser **Gerät 06H** production drawing no V17310DU1 dated December 5, 1944, titled *Verschlußstück, vollständig (Untergruppe)* (bolt head, sub-assembly), showing the extractor located at approximately a 45° angle on the right side of the bolt face. courtesy Walter Schmid



50. Mauser **Gerät 06H** production drawing no V17354C dated December 21, 1944, titled *Kolben* (buttstock), showing the simplified design of the last style of this wooden component.

Compare with the early style of buttstock, shown in fig 30. courtesy Walter Schmid

## The Final Mauser Monthly Report

Aktennotiz Nr 3847

### Monthly Report for January, 1945

**M.7055: Self-loading rifle, K43**

In the department for Spanlose Formung [literally, "chipless forming"; i.e. non-machining; referring to production by stamping, drawing, forming, etc] two new receivers of a strengthened design were being worked upon.

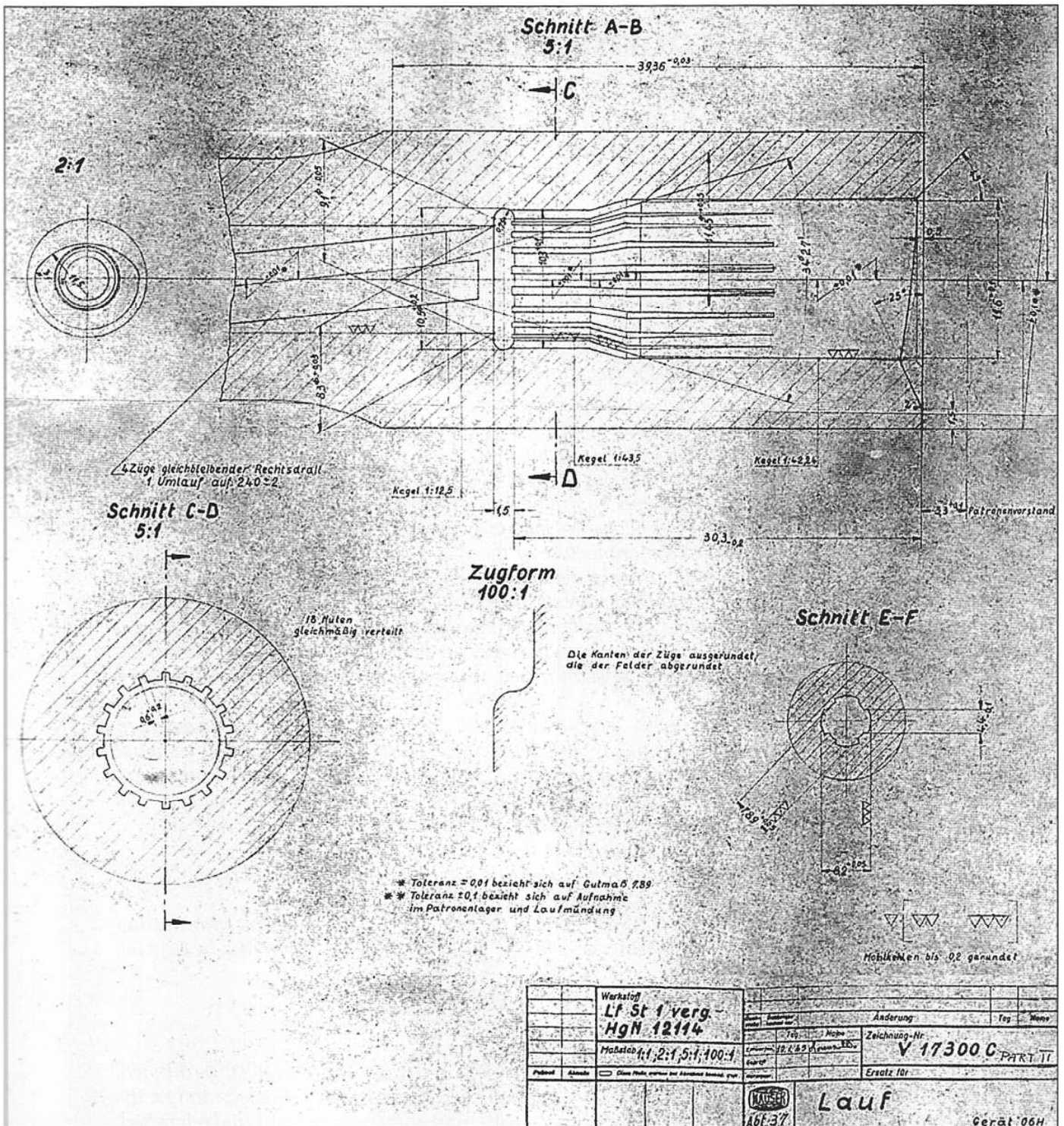
**M.7066: MP (locked system)**

The new pressed receivers are in the Press-shop and are still being manufactured.

**V.5823, V.5911: MP (on the unlocked system) - Mauser Assault Rifle**

The first prototype of the new model has undergone a 5,000-round trial shoot by the firm.

Furthermore experimental firing was carried out at [a temperature of] -40° [Centigrade]. Operation and durability were very good at these proving trials. The second model was completed for the authorities. The chamber, muzzle brake, main-spring and ratios of the angles can still not be investigated due to a shortage of [electrical] current. A theoretical investigation of the half-locked [roller locking] mechanism, is coming to its conclusion.



51. Mauser Gerät 06H production drawing no V17300C dated January 19, 1945, titled *Lauf* (barrel), showing details of the eighteen flutes in the chamber.

courtesy Walter Schmid

## Ordering the C-Serie

Other accounts have dated the order from the *Waffenamt* for a *Nullserie* of the half-locked StG45(M) to some time in 1944, but in fact the Mauser firm was not directed to take action on this important matter until early in 1945.

The following is a translation of a Mauser *Aktennotiz* dated February 12, 1945 from Dr Harnisch of Abt 80 (*Maschinenwaffen u Pistolenbau*) and Herr Starmanns of Abt 01 (*Spanlose Formung*), regarding the initial production order for the StG45(M):

*A C-series of 30 pieces is to be manufactured of this weapon. Completion date for these weapons is the end of March, 1945, with completion of the components by mid-March. Technical drawings for this equipment have been submitted by Abt [Dept] 37. The manufacture is the result of a V-order, with Dept 37 responsible. The necessary manufacturing equipment will be set up as sub-orders to this V-order.*

*Work preparation is centrally located at Dept 804.0. From here the individual production orders will be given and the material dispositions will be made. Production materials, with the agreement of Dept 37, will be taken from the V-warehouse, from the warehouses 70, 80, and 01, whereby Dept 46 should be involved as much as possible when special questions arise. If possible, materials should be readied for the manufacture of a total of 100 weapons, however, for the time being orders should only be written up for the production of 30 weapons.*

*Component manufacture was allotted as follows, whereby the departments in question are themselves responsible for the manufacture of these components, to have them ready for assembly, and if possible also hardened, as well as make the necessary operating equipment themselves, resp. contact tool building directly if special equipment is needed. Since for these 30 weapons interchangeability of operationally important parts has to be guaranteed, the Planning Department 432.0 has been given the order, in agreement with Dept 37, to plan the most important operating gauges on short notice, which will ensure this request, and have them constructed by 800.2.*

*Regarding the production of these gauges by 60, resp. 520.0, 80 will decide each case when the drawings for the gauges are ready. It is pointed out here, that only the most essential operating gauges should be produced in their simplest form. The respective component manufacturers have to adjust their component production according to these gauges. The latest delivery date for these gauges is the end of February.*

*Dept 520.0: trigger complete, butt support, dust cover, butt plate.*

*Dept 01: housing (mechanical production work in Dept 840.0, head foreman Hezel). Upper band complete.*

*Dept 60: group sight complete, i.e. 20 done in the old design, 10 new design. Drawing and stamping operation for the rear sight base will be done by Dept 01, tools, however, by Dept 60.*

*Dept 730.0: barrel.*

*Dept 33: bolt mechanism parts.*

*Dept 90: magazine holder and bolt, butt holding pin and some bushings.*

*Dept 740.0: butt.*

*Assembly will be done under the supervision of Dept 37. Assembly rooms still to be decided.*

*Dept 700.4 is responsible for delivery of finished forge pieces for the cam piece and for the main spring guide. All other finished forge parts will be cut from the solid blank and refinished, if time does not permit production of a stamp. Production of the necessary springs will be arranged in agreement with 890.0 - 353.0.*

*Dept 37 has furnished 3 sets of drawings, i.e. for 804.0, 432.0, and one for the production departments. If further drawings are needed, they should be requested directly from Dept 37. Relevant improvement suggestions should be discussed with Dept 37. In principle, changes can only be done by, and with the agreement of, Dept 37. The same holds true for materials and heat treating specifications ordered. Regarding the latter, Dept 46 should be engaged.*

*Keeping track of the completion date for the order is to be done by Dept 805.0.*

*The next conference for all parties taking part in the manufacturing was set for Saturday, Feb 2, at 9 a.m. in the office of 80.*

Lfd Nr	Stückzahl	Fertigteil				Werkstoff	
		Benennung	Sach-Nr	Zeichn.- End- buchst.	Einzel- gewicht kg	Bezeichnung	Eprouvette gruppen
1	2	3	4	5	6	7	8
		Gehäuse, vollst.					
1	1	Oberring (Untergruppe)	V 16850 D				
2	1	Oberring	V 16847 D			St VII 23	
3	1	Bügel	V 16848 E			St VII 23	
4	1	Kolben	V 16892 D			St C 60.61	
5	1	Zylinder	V 16723 E			St C 25.61	
6	1	Verbindungsstange	V 16724 E			St C 60.61	
7	1	Stoßstange	V 16725 D			St C 60.61	
8	1	Ring	V 16814 E			St C 16.61	
9	1	Schließfeder 16 Dr.φ, 15,5 inn.φ 460lg 84 Windg.					
10							
11							
12	1	Rohr	V 16774 B			St VII 23	
13	1	Hallefeder z. Oberring	V 16849 E			Fed. St. 1 HgN 12114	
14	1	Visierfuß, geprägt	V 16835 D			St VII 23	
15	1	Visierfuß, fertig (Untergr.)	V 16836 D			St VII 23	
16	1	Kurvenstück	V 16837 E			St Bl 50	
17	1	Halbwinkel,	V 16752 E			St VII 23	
18	1	Visierfuß, geschweißt	V 16746 E			—	
19	1	Visierklappe	V 16747 C			St C 60.61	
20	1	Visierschieber	V 16743 D			St C 60.61	
21	1	Visierdrücker	V 16746 D			St C 60.61	
22	1	Schraubenfeder					
23	1	Feder f. Visierklappe					
24	1	Nietstift B 3 h9 x 22	HgN 15205			FluBstahl	
25	1	Verriegelungsstück	V 16798 B			St C 35.61	
26	1	Lauf	V 16720 C			LF St 1 verg. HgN 12114	
27	1	Zylinderstift 6m 6x 36	HgN 15204	DIN 7		St 60.11	
28	2	Führungsleiste	V 16844 D			St VII 23	
29		Kornhalter (Untergruppe)	V 16882 D				
30	1	Kornhalter	V 16883 D			St 50.11	
31	1	Korn	V 16884 E			St C 45.61	
32	1	Sperrbolzen	V 16885 E			St C 16.61	
33	1	Kornschutz	V 16887 E			Fed. St. 1 HgN 12114	
34	2	Zylinderstift 4 m 6 x 14	DIN 7 HgN 15204			St 60.11	
35	1	Kasten	V 16773 B			St VII 23	
36		Kasten (Untergruppe)	V 16775 D			—	
37	1	Kolbenhallerführung	V 16778 E			St VII 23	
38	1	Magazinholler	V 16929 E			St VII 23	
39	1	Bolzen	V 16927 E			St C 16.61	
40	1	Schraubenfeder 1 Dr. φ; 8,5 inn. φ 22lg 6 Windg.					
41	1	Gasstutzen	V 16721 E			St C 45.61	
42		Schaft (Untergruppe)	V 16759 B				
43	1	Kolben	V 16924 B				
44	1	Kolbenhaller	V 16761 D			St VII 23	
45	1	Kopfplatte	V 16925 E			St Bl. 50	
46	2	Nietstiftle A 4 h 11 x 30	HgN 15205			FluBstahl	
47	2	Senkholzschraube 3 x 15 DIN 97	HgN 14 233				
48							
49							
50		Griff, vollständig (Untergruppe)	V 16825 B				
51	1	Griffschale, links	V 16822 B			St VII 23	
52	1	Griffschale, rechts	V 16821 B			St VII 23	
53	1	Abzuggabel	V 16819 C			St VII 23	
54	1	Steuerhebel	V 16940 D			Fed. St.	

51 During February, 1945, lists were drawn up of all the Department 37 drawings which were prepared for use in manufacturing the C-Serie.

This composite lists the first 54 drawings of components for the receiver and barrel assemblies.

courtesy Walter Schmid

Lfd Nr	Stückzahl	Fertigteil				Werkstoff	
		Benennung	Sach-Nr	Zeichn.- End- buchst.	Einzel- gewicht kg	Bezeichnung	Eprouvette gruppen
1	2	3	4	5	6	7	8
55	1	Verkleidungsring	V 16953 D				St VII 23
56	1	Abzughebel	V 16739 D				St C 60.61
57	1	Klinke	V 16824 D				St VII 23
58	1	Abzug	V 16818 D				St VII 23
59	1	Hahn	V 16948 D				St C 60.61
60	1	Sicherung	V 16941 D				St C 16.61
61	1	Auswerfer	V 16753 E				Fed. St.
62	1	Anschlagbolzen	V 16830 E				St C 16.61
63	2	Ringe	V 16942 E				St 37.12
64	1	Bolzen f. Sicherung	V 16947 E				St C 60.61
65	1	Buchse	V 16943 E				St 37.12
66	1	Schlagfeder	V 16815 E				Fed. St. Draht
67	1	Auswerferfeder	V 16954 E				Fed. St. Draht
68	1	Feder f. Abzuggabel	V 16951 E				Fed. St. Draht
69		Rastfeder (Untergruppe)	V 16952 E				
70	1	Feder	V 16950 E				Fed. St.
71	1	Umstellhebel	V 16944 E				St VII 23
72	1	Sicherungshebel	V 16801 E				St VII 23
73	1	Zylinderstift 6 h 11 x 18 DIN 7	HgN 15204				FluBstahl
74	2	Nietstift B 4 h9 x 18	HgN 15205				FluBstahl
75	1	Nietstift B 4 h9 x 12	HgN 15205				FluBstahl
76	1	Nietstift B 3 h9 x 9	HgN 15205				FluBstahl
77	1	Nietstift B 5 h9 x 22	HgN 15205				FluBstahl
78							
79							
80							
81							
82	1	Verschlußstück	V 16865 B				St C 25.61
83	1	Steuerstück	V 16874 C				St C 25.61
84	1	Schlagbolzen	V 16862 D				St C 60.61
85	1	Auszieher	V 16867 D				Fed. St. 1 HgN 12114
86	1	Auszieherfeder	V 16868 D				Federstahldraht
87	2	Walzen	V 16866 E				St C 60.61
88	1	Kammerstengel	V 16871 D				St C 35.61
89		Kammerstengel (Untergruppe)	V 16873 E				—
90	1	Scheibe	V 16872 E				St VII 23
91		Steuerhülse mit Federführungsrohr	V 16710 D				—
92	1	Steuerhülse	V 16869 D				St C 35.61
93	1	Rohr	V 16823 E				St VII 23
94							
95							
96							
97	1	Mündungsbremse	V 16993 B				St VII 23
98	1	Staubdeckel	V 16809 B				St VII 23
99	1	Deckel	V 16845 B				St VII 23
100		Deckel geschweißt	V 16851 D				—
101	1	Feder z. Deckel	V 16846 D				Fed. St.
102		Griffkastenbolzen (Untergruppe)	V 16762 E				—
103	1	Griffkastenbolzen	V 16763 E				St C 16.61
104	1	Feder z. Griffkastenbolzen	V 16764 E				Fed. St. 1

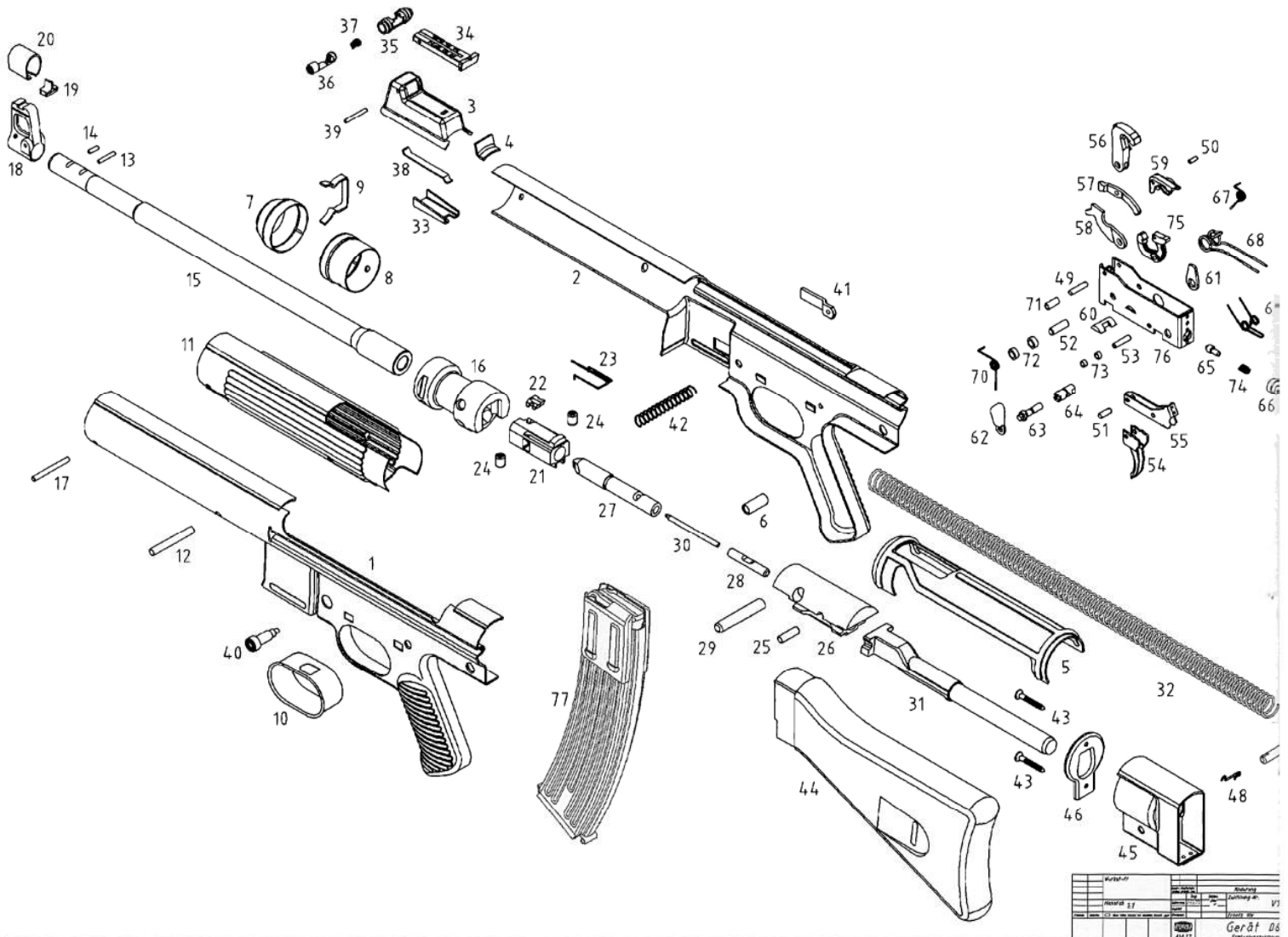
Stückliste zu V 16955 B

53. A further composite, listing drawings 55 through 104 of components for the receiver and barrel assemblies.

Besides the sequential listing number, the lists show the quantity of each part required, the part name, drawing number, and material to be used in the manufacture of the component.

courtesy Walter Schmid

# A Retrospective of StG45(M) Drawings



54. An exploded view of the *Gerät 06H*, with components numbered in accordance with the following drawing list.

This drawing was prepared as an adjunct to creating the solid model of the *Gerät 06H*, a number of views of which are featured in Chapter Four.

courtesy Ralf Dieckmann,  
Dieckmann True Position Inc

The following listing of all 77 components of the *Gerät 06H*/StG45(M) has been prepared by Ralf Dieckmann after compiling all the related material to hand, including a number of the actual drawings which were supplied by the late Thomas B Dugelby and Walter Schmid. Mr Dieckmann has also kindly provided the translations of the German part names.

In counting up the number of components in the entire weapon, each part is given only one num-

ber - for example, there are two locking rollers, but both are numbered 24 and count as only one part.

Curiously, the dates of drawings for components of the earlier gas-operated *Gerät 06* (and even a few generic sight parts for an unnamed weapon), overlap the dates of several of the specific drawings for components unique to the half-locked *Gerät 06H*/StG45(M), even though some of former, such as those for the gas piston, etc, were no longer necessary.

Part No	Part Name (German)	Translation	Qty/Gun	Notes	Date	Ref
V16753E	<i>Auswerfer</i>	Ejector	0	marked 06H, not used	9/10/44	
V16774E	<i>Rohr</i>	Tube	0	unclear where used	30/9/44	
V17235B	<i>Gerät 06H</i>	Device 06H	1		XX/XX/44	
V172xxx	<i>Kasten, vollständig</i>	Receiver assembly	1	no drawing		
V172xxx	<i>Kasten, links</i>	Receiver, left side	1	no drawing		1
V172xxx	<i>Kasten, rechts</i>	Receiver, right side	1	no drawing		2
V172xxx	<i>Visierfuß, geprägt (Rohteil)</i>	Rear sight base, formed (Blank)	1	no drawing		
V172xxx	<i>Visierfuß bearbeitet</i>	Rear sight base, machined	1	no drawing		3
V172xxx	<i>Haltewinkel</i>	Dust cover holddown	1	no drawing		4
V172xxx	<i>Visierfuß, fertig (Untergruppe)</i>	Rear sight base, finished (Subassembly)	1	no drawing		
V172xxx	<i>Staubdeckel</i>	Dust cover	1	no drawing		5
V172xxx	<i>Buchse (Rohteil)</i>	Receiver support sleeve (Blank)	1	no drawing		6
V172xxx	<i>Oberring, außen</i>	Outer Receiver cap	1	no drawing		7
V172xxx	<i>Oberring, innen</i>	Inner Receiver cap	1	no drawing		8
V172xxx	<i>Bügel</i>	Sling swivel	1	no drawing		9
V172xxx	<i>Verkleidungsring</i>	Trigger guard liner	1	no drawing		10
V172xxx	<i>Handschutz</i>	Handguard	1	no drawing		11
V17299D	<i>Stückliste zu V17299D, Lauf vollständig</i>	Parts list for V17299D, Barrel assembly	1		12/2/45	
	<i>Zylinderstift, 6m6x40, DIN7 (Länger?)</i>	Cylindrical pin, 6m6x40, DIN7 (Longer?)	1	retains Barrel extension 16		12
	<i>Zylinderstift, 3m6x18, DIN7</i>	Cylindrical pin, 3m6x18, DIN7	1	retains Front sight base 18		13
	<i>Zylinderstift, 3m6x10, DIN7</i>	Cylindrical pin, 3m6x10, DIN7	1	retains Front sight base 18		14
V17300C I	<i>Patronenlagerrillen, für Lauf</i>	Chamber flutes	1		12/28/44	
V17300C II	<i>Lauf</i>	Barrel	1		10/1/45	15
V17301C I	<i>Verriegelungsstück</i>	Barrel extension	0	earlier version, not used	5/1/45	
V17301C II	<i>Verriegelungsstück</i>	Barrel extension	1	additional welding locations	3/2/45	16
V173xx	<i>Zylinderstift, 4m4x40, DIN7</i>	Cylindrical pin, 4m4x40, DIN7	1	retains Handguard 11		17
V17303E	<i>Kornhalter (Rohteil)</i>	Front sight base (Blank)	1		8/11/44	
V17304D	<i>Kornhalter</i>	Front sight base	1		29/9/44	18
V17305E	<i>Korn</i>	Front sight	1		16/10/44	19
V17306E	<i>Kornschutz</i>	Front sight hood	1		11/11/44	20
V17310D U	<i>Verschlußstück, vollständig (Untergruppe)</i>	Bolt assembly (Subassembly)	1		12/5/44	
V17311C	<i>Verschlußstück</i>	Bolt	1		26/9/44	21
V17312D	<i>Auszieher</i>	Extractor	1		11/11/44	22
V17313D	<i>Auszieherfeder</i>	Extactor spring	1		3/10/44	23
V17314E	<i>Walze</i>	Locking roller	2		2/1/45	24
V17315D U	<i>Steuerstück, vollständig (Untergruppe)</i>	Bolt carrier assembly (Subassembly)	1		5/10/44	
	<i>Zylinderstift, 6m6x20, DIN7</i>	Cylindrical pin, 6m6x20, DIN7	1	retains Striker 28		25
V17316C	<i>Steuerstück (Rohteil)</i>	Bolt carrier (Blank)	1		22/9/44	
V17317C	<i>Steuerstück</i>	Bolt carrier	1		13/1/44	26
V17318D	<i>Steuerbolzen</i>	Roller cam	1		9/2/45	27
V17319E	<i>Schlagstück</i>	Striker	1		12/1/45	28

## 54 A Retrospective of StG45(M) Drawings

Part No	Part Name (German)	Translation	Qty/Gun	Notes	Date	Ref
V17320D	<i>Kammerstengel</i>	Cocking handle	1		15/1/45	29
V17321E	<i>Schlagbolzen (Sollte Schlagstift heissen)</i>	Firing pin	1		25/9/44	30
V17322D	<i>Führungsstück (Rohteil)</i>	Return spring guide (Blank)	1		20/2/45	
V17323D	<i>Führungsstück, bearbeitet</i>	Return spring guide (Machined)	1		9/3/45	31
V17324E	<i>Schließfeder</i>	Return spring	1		17/2/45	32
V17337D	<i>Kurvenstück</i>	Rear sight cam	1		5/9/44	33
V17339C	<i>Visierklappe</i>	Rear sight	1		5/10/44	34
V17340E	<i>Visierschieber</i>	Rear sight elevation slide	1		6/9/44	35
V17341E	<i>Visierdrücker</i>	Rearsight elevation latch	1		14/10/44	36
V173xx	<i>Feder für Visierdrücker</i>	Elevation latch spring	1	no drawing		37
V17343E	<i>Blattfeder</i>	Rearsight elevation spring	1		23/12/44	38
V173xx	<i>Bolzen</i>	Rear sight pivot, 3x22	1	no drawing		39
V173xx	<i>Bolzen</i>	Magazine latch plunger	1	there may be a drawing		40
V17346E	<i>Magazinhalter</i>	Magazine latch	1	no drawing	10/11/44	41
V173xx	<i>Feder für Magazinhalter</i>	Magazine latch spring	1			42
V17353D	<i>Stückliste zu V17353D, Kolben vollständig</i>	Parts list for V17353D, Buttstock assembly	1		12/2/45	
	<i>Holzschraube, 4x30, DIN97</i>	Wood screw, 4x30, DIN97	2			43
V17354C	<i>Kolben</i>	Buttstock	1		21/12/44	44
V17355D	<i>Kolbenhalter</i>	Buttstock shroud	1		13/2/45	45
V17356E	<i>Platte</i>	Buttstock plate	1		4/10/44	46
V17357E U	<i>Haltebolzen, vollständig (Untergruppe)</i>	Buttstock retaining pin assembly (Sub assy.)	1		3/11/44	
V17358E	<i>Haltebolzen</i>	Buttstock retaining pin	1		5/2/45	47
V17359E	<i>Feder zu Haltebolzen</i>	Buttstock retaining pin spring	1		5/3/45	48
V17362D I	<i>Stückliste zu V17362D, Abzug vollständig</i>	Parts list for V17362D, Trigger housing assembly	1		13/2/45	
V17362D II	<i>Stückliste zu V17362D, Abzug</i>	Sheet two of above	1		13/2/45	
	<i>Nietstift, B4h11x20 HgN 15205</i>	Rivetable pivot, B4h11x20 HgN 15205	1	Automatic sear pivot		49
	<i>Nietstift, B4h11x8 HgN 15205</i>	Rivetable pivot, B4h11x8 HgN 15205	1	Secondary sear pivot		50
	<i>Nietstift, B3h11x10 HgN 15205</i>	Rivetable pivot, B3h11x10 HgN 15205	1	Trigger/Trigger bar pivot		51
	<i>Zylinderstift, 6h11x18, DIN7</i>	Cylindrical pin, 6h11x18, DIN7	1	Hammer pivot		52
	<i>Zylinderstift, 4h11x18, DIN7</i>	Cylindrical pin, 4h11x18, DIN7	1	Sear pivot		53
V17363D	<i>Abzugkasten, geschweißt</i>	Trigger housing, welded	1		7/2/45	
V17364D I	<i>Abzug (Prägeteil)</i>	Trigger (Formed blank)	1		31/3/44	
V17364D II	<i>Abzug</i>	Trigger	1		31/3/44	54
V17365C	<i>Abzuggabel</i>	Trigger bar	1	no H after 06 on drawing	25/4/44	55
V17366D I	<i>Abzughebel (Rohteil)</i>	Sear (Forged blank)	1		17/1/45	
V17366D II	<i>Abzughebel</i>	Sear	0	not used	12/6/44	
V17367D	<i>Hahn, bearbeitet</i>	Hammer, machined	1		27/4/44	56
V17368D	<i>Steuerhebel</i>	Automatic sear	1		11/1/45	57
V17369E	<i>Auswerfer</i>	Ejector	1		10/1/45	58

Part No	Part Name (German)	Translation	Qty/Gun	Notes	Date	Ref
V17370D	<i>Klinke</i>	Secondary sear	1		5/4/44	59
V17371E	<i>Anschlagbolzen</i>	Trigger abutment	1		12/4/44	60
V17372E	<i>Umstellhebel</i>	Secondary sear blocker	1		19/4/44	61
V17373E	<i>Sicherungshebel, vollständig (Untergruppe)</i>	Selector lever assembly (Subassembly)	1		3/11/44	
V17374E	<i>Sicherungshebel</i>	Selector lever	1		29/12/44	62
V17375D	<i>Bolzen</i>	Selector lever pivot	1		28/9/44	63
V17376D	<i>Sicherung</i>	Safety shaft	1		19/9/44	64
V17377E	<i>Bolzen</i>	Safety shaft plunger	1		29/12/44	65
V17378E	<i>Buchse</i>	Safety spring seat	1		2/1/45	66
V17379E	<i>Feder für Steuerhebel</i>	Automatic sear spring	1		16/2/45	67
V17380E	<i>Schlagfeder</i>	Hammer spring	1		16/2/45	68
V17381E	<i>Feder für Abzuggabel</i>	Trigger bar spring	1		16/2/45	69
V17382E	<i>Auswerferfeder</i>	Ejector spring	1		23/1/45	70
V17383E	<i>Buchse</i>	Automatic sear spacer	1		12/1/45	71
V17384E	<i>Ring</i>	Hammer spacer	2		12/1/45	72
V17385E	<i>Ring</i>	Trigger bar spacer	2		4/12/44	73
V17387F	<i>Rastfeder</i>	Safety spring	1		19,2/45	74
V17388D	<i>Abzughebel, bearbeitet</i>	Sear, machined	1		17/1/45	75
V17389D	<i>Abzugkasten, bearbeitet</i>	Trigger housing, machined	1		29/12/44	76
V17396D	<i>Hahn (Rohteil) Magazin, vollständig</i>	Hammer Magazine assembly	1	StG44 magazine (9 parts)	21/2/45	77

## An Overview of the StG45(M)

by Ott von Lossnitzer

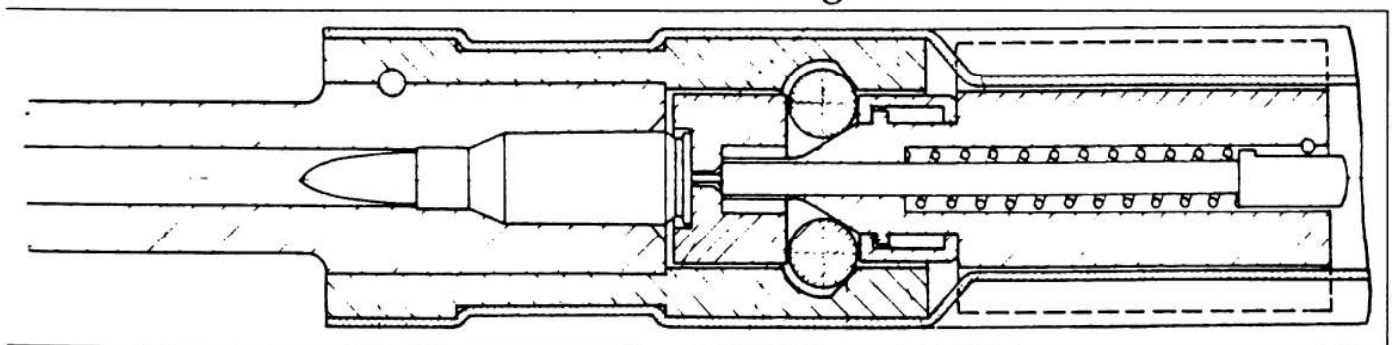
Ott von Lossnitzer, the wartime Director of the Mauser "Gruppe 30" series of departments, which included the Weapons Research Institute and all Weapons Development at the Oberndorf factory, was also noted as the chairman of the *SKInfWaffen*.

Von Lossnitzer was debriefed by the Allies shortly after the war at Work Centre Unterlüss, where

a number of ranking technical personnel were invited to "tell all" about their wartime experiences.

Salient excerpts from two documents produced by von Lossnitzer, the main one being the 25-page Unterlüss report no 257 (abbreviated as "Unt 297") and the other a hitherto unpublished history of Mauser Werke, are as follows:

### *The New Mauser-Sturmgewehr 45*



55. A drawing from von Lossnitzer's 25-page Unterlüss report no 257, showing a top sectioned view of the half-locked roller action as utilised in the StG45(M).

The drawing depicts the bolt assembly in the fully-forward position, ready to fire the chambered cartridge.

courtesy Les Field



. . . The development which promised the best success was submitted by Mauser . . . with the same ballistical data as the StG44. The new breech system permitted a maximum weapon weight of only 4.2kg (9.3 lbs.), so that the StG45 was no heavier than the K98k. The rate of fire averaged 420 rpm.

The barrel length laid down for the short cartridge allowed a weapon with a shorter overall length than the K98k, and the magazine of the StG44 was taken over without alteration.

### **Breech System**

In this weapon Mauser presented a new locking system with rollers, different from that used in the MG42. The two locking rollers are situated on the right and left, close behind the face of the bolt. Locking takes place due to the weight of the conical forward portion of the breech block assembly [the Steuerstück] slowing the unlocking of the rollers from the slopes in the locking piece [barrel extension].

The first experimental models were gas-operated, with a gas piston on top of the barrel which contacted the breech block carrier. This type of action was not simple enough, and the HWA therefore set us the task to examine whether an unlocked breech could be produced with a plain delayed blowback mechanism for the short cartridge. With its distinct shoulder, the short 7.92x33mm cartridge produced pressures averaging 3,400 atmospheres (roughly 49,300 psi), so this appeared somewhat difficult. The results of our examination showed that either the breech mass had to be very high, with the weapon consequently being too heavy, or the opening of the bolt during the time from the beginning of ignition until the projectile left the muzzle had to be delayed. Here the backward movement of the breech head had to remain slight enough at the beginning so that the cartridge case could withstand deformation or tearing under the influence of the residual gas pressure, in order to avoid weapon malfunctions. Initiation of the opening movement, caused directly by the face of the bolt, was controlled by the rollers lying between the two slopes to produce a delayed blowback breech mechanism.

Through examination and trials, it was determined that 45° represented the most favourable solution for both the angles in the locking piece and on the front of the Steuerstück [control piece]. The trials were carried out with oiled ammunition, with dry ammunition and a dry chamber, as well as with the weapon liberally dusted with a dusty chamber and magazine. Previous trials had been carried out in climate rooms capable of conditions of high heat or extreme cold, and in all cases reliable functioning was attained.

### **Technical Manufacturing Advantages**

Besides the barrel, locking piece and breech mechanism, all the chief parts were stamped out of sheet metal, which can be produced with the necessary accuracy for reliable functioning. The form is so chosen that particularly superior deep drawing qualities of the sheet metal parts are not necessary. Stiffness and stability of the sheet metal parts against shocks, etc, have been attained by beading. The receiver with barrel casing and magazine housing consisted of two sheet-metal parts formed like bowls. The guide ribs for the breech mechanism were stamped directly into the right and left receiver walls. The pistol grip and trigger housing were also made out of two halves, mounted together.

The small parts of the weapon are also mostly stamped, whereby sub-assemblies are formed from single stamped parts to increase their strength.

After having assembled the entire trigger mechanism including the hammer into a small metal box, the complete group was inserted into the receiver casing and held in place by the change lever. The spiral hammer spring also serves to push out the magazine catch.

The shoulder stock, a plain unprofiled board, is fixed to the rear end of the receiver, and the front sight base was also configured as a single stamped part.

All the welded joints were placed in such a way that they were not directly stressed by tension or compression, and care was taken so that distortion or alteration did not occur during their production.

The weapon could be fired semi-automatically or automatically. The 30-round magazine was inserted from below, and was so designed that it could be used as a monopod when the gunner was lying in the prone position . . . The rate of fire was 350 to 400 rounds per minute.

*Due to the reduced energy of the short cartridge the gun could be fired in any position, even when the soldier was moving. The sheet metal receiver was a masterpiece of modern stamping techniques. It contained on the right and left side two pressed-in rails in which the bolt assembly was guided back and forth. The inside of both rails was hard coated by a German process very similar to the Martin Hardcoating known and used in the USA. The only machined steel components were the barrel, bolt assembly, and the barrel extension. The barrels were produced by the "Dully method", whereby a hardened ball with rifling on its outside is pressed through the bore.*

*The simplicity of the plain carbon steel components and the use of many stamped parts would have resulted in a production time of three to four hours in mass production, in comparison to 12 to 14 hours for the regular K98k rifle. According to the Mauser Werke calculations, this design resulted in a saving of 50% in material and assembly time compared with the StG44.*

### **Other Characteristics and Last Stage of Development**

*The return spring was released by removing the butt assembly, whereby the breech mechanism could be safely worked on or removed.*

*The extractor was not the customary elastic lever, but a laterally sliding steel block, under pressure from a spiral spring, the ends of which simultaneously retained the two locking rollers in the breech head.*

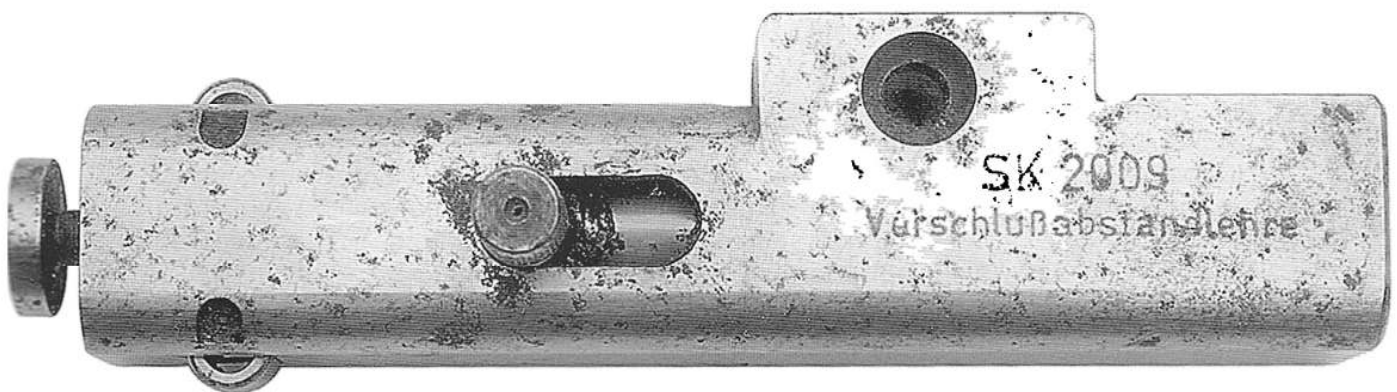
*The front sight base was designed to accommodate a compensator or the standard rifle grenade launcher cup.*

*An endurance test of more than 7,000 rounds of automatic fire was carried out by Mauser at Oberndorf with the initial model with the delayed blowback mechanism. The HWA repeated a 5,000-round endurance test with two further models at the Army Proving Grounds at Kummersdorf, and dust and cold tests were also conducted there.*

*On the strength of the good results of these firing trials, Mauser Werke received an order to produce 30 weapons for an initial user trial, to be conducted by the infantry demonstration battalion at Döberitz.*

*This production was under way, but the end of the war put an end to the continuation of this work and to the planned large-scale series production which was to have followed.*

## **The Final Step**



56. A late-war Mauser gauge, numbered SK 2009, labelled *Verschlußabstandlehre* (headspace gauge), which was intended to be inserted into the receiver of the StG45(M) and the rollers pushed out into the locking recesses, after which the position of the plunger on the face of the gauge would presumably give an indication of the headspace measurement. courtesy Reiner Herrmann

The last official mention of the development of the StG45(M) to have taken place during the war was an internal Mauser memorandum from Department 463.3 to Department 37. This was a listing of alterations to the drawings of some 18 components, mostly concerning material (magazine catch, ejector, trigger, bolt handle) and hardness specifications (bolt components, hammer, etc) which had been agreed upon “based on the discussion held on March 13, 1945”.

Dr Maier’s 1996 letter to John McCabe sums up the development as follows:

*. . . Early in the spring of 1945, the bolt assembly parts for the 30 StG45(M) rifle sets were reported to have been manufactured. Some of the sheet metal receivers were still missing. There was no time left before the end of the war on May 8, 1945 to assemble any of these 30 rifles . . .*

## Chapter Four

# The Legacy of the StG45(M)

## The Cliffhanger on the Train

**A**s recorded on pages 66 and 67 of the Collector Grade title *Mauser: Original Oberndorf Sporting Rifles*,

### *A Mad Finale, Partially Averted*

*At the beginning of April, 1945, orders were received for the “Relocation of Important Final Military Armament Production”, under which Mauser was to crate up and prepare to move all the machinery needed for a monthly production of 20,000 K98ks, all aircraft armament currently being tested, all machinery-design drawings of the Mauser-Volksgewehr [the Mauser version of the last-ditch “People’s Rifle”], and all the important records and drawings of the Weapon Research Institute [von Lossnitzer’s Group 3]. According to the plan, future production was supposed to be started up again in Ravensburg, and in one other town located in the Alpine region. To have the necessary personnel to begin new production, 200 engineers and workers from the Weapon Research Institute and from production were ordered to go along.*

*Along with the removal order came a demolition squad, with orders from the Führer himself to blow up the Mauser Works after the material and staff destined for relocation had left. Only the cleverness of the company management and delaying tactics during loading activities made it possible to avert blowing up the factory.*

### *The “Mauser-Train” Runs Out of Steam*

*During the night of April 19 to 20, 1945—in his bunker in Berlin Hitler was just celebrating his last birthday—the 29-car “Mauser-Train” pulled slowly away from the Mauser factory site. After a trip lasting eleven days, interrupted several times by air raids, the train reached its destination on April 30: a wind-tunnel building site in the Ötztal, high in the Austrian mountains. Unloading the train completely, or even thinking of starting production again, was no longer possible because the war was clearly coming to an end.*

*Four weeks later, on June 1, 1945, the Mauser-Train was discovered by a joint British and American CIOS team (Combined Intelligence Objectives Subcommittee). This officer team made up of nine specialists had been searching through the largely undamaged Oberndorf factory site on May 25, and had realised that the most important prototypes of the weapons they were looking for were no longer at the factory.*

## Notes from a Mauser-Train Passenger

In a further excerpt from his 1996 letter to John McCabe, Mauser mathematician Dr Karl Maier adds his personal reminiscence to the above concerning the fate of the 30 sets of StG45(M) components, as follows:

*. . . On about April 20, 1945, I left Oberndorf with the Mauser research team to continue work in a safe tunnel in Haiming, Austria. We had unfinished guns, sets of drawings, etc, with us. In the*

*beginning of May, we were overrun by American forces and soon after the war ended.*

*Some personnel of the Mauser research team and of other companies were then gathered together at Unterlüss, in the British zone of Germany, under a British-American command. There the German engineers evaluated the production drawings and assembled a number of StG45(M) rifles. I belonged to that team until it was dissolved on March 31, 1948.*

*However, I was never at Unterlüss because of a 20-month stay in an orthopaedic hospital at Bad Rappenau, Germany, because of spondylitis. While I had been a close eye-witness to the development work at Oberndorf, I have no intimate knowledge of what was done at Unterlüss, or how*

*many StG45(M) rifles were actually assembled there and to which museums or collectors they went. The saga has it, that 19 rifles were assembled there, a number I greatly doubt. My only contribution to Unterlüss was a handwritten report on the theory of the retarded blowback roller locking system.*

*Some of the material at Unterlüss (rifles, sets of drawings, Mauser reports) was collected at the MoD Pattern Room in England. The British were much more thorough and methodical than the Americans and thanks to their archive, a number of important Mauser reports describing the development steps in detail have been found just recently.*

## The CIOS Interrogate Altenburger and Illenberger

### Altenburger States that No Drawings Remain at the Factory

The CIOS team which visited the Mauser factory and the site of the Mauser train at Lager Haiming interrogated a number of Mauser executives, including the head of Department 37, Herr Altenburger. Excerpts from the report of this interrogation are as follows:

*. . . He stated that he had been with the firm since 1933, his present position being Chief Constructor for Light Weapons up to 15mm. He stated that he*

*had been working on the Infantry Pistol 7.9mm short cartridge, the weapon being called the MP45 Mauser. Parts and models of this gun had been sent [on the train] to Ravensburg, but some parts were still in the factory. No drawings, he stated, were at Oberndorf. The principal advantage of this weapon was the ease with which it could be produced, using only straight carbon steels . . .*

### Erich Illenberger Confirms that 30 Parts Sets are On the Train

Erich Illenberger, the engineer responsible for ground machine gun development within Altenburger's Department 37, was also interrogated. The text of the CIOS report of this interrogation reads as follows:

*. . . He gave his age as 39, and stated he had been a group leader of four men. He had been with the firm for eleven years. He had worked on the bolt design for the [Gerät 06H]. This was a roller locking design to permit a bolt of half the weight of the normal. In this way, the elimination of the present*

*gas method of operation could be brought about. He stated there was one gas operated model on the train, and there are four finished models of the latest design and sets of components for 30 or more. The original chamber of the Sturmgewehr [45(M)] had no [flutes] but later it had been opened out by Mr Kunert to facilitate extraction. [This was also confirmed during the interrogation of Mr Altenburger, who stated that "We had 18 flutes in the chamber of the MP45."]*

## The Spoils of War

Dr Maier briefly recalls the end of the war at the Mauser factory in Oberndorf by saying that "The research teams of the Allied forces, the French on one side and the Americans, British and Canadians on the other, took sets of drawings and parts as they wanted." Otto Schulze, who during the war was a Senior Weapon Inspector in Department GL/C-E6 of

the *Oberkommando der Luftwaffe* (OKL) and who had been the project manager for the *Luftwaffe* FG42, programme, later confirmed that "The particulars of [the roller-locked StG45(M)] were largely lost during the capitulation."

## Assembling the StG45(M) Component Sets

The actual number of parts sets assembled, and even where they were assembled, remain matters of conjecture. Notwithstanding Dr Maier's statement, above, that assembly took place at Unterlüss, other documents say that some were assembled by ex-

members of the staff of Mauser Werke who were imprisoned at the British POW camp at Eschede. In either case, the finished weapons went at the whim of the victorious Allies to collections in the US, UK and France.

## Serial No 2: the Only Remaining StG45(M)



Left and right side views of *Gerät 06H/StG45(M)* serial no 2, the only virtually complete example of this rare arm known to exist today. This example has a ribbed sheet-metal handguard and is fitted with the short 10-round

version of the MP44 magazine.

A comparison of the butt with that shown in the drawing in fig 50 indicates that the butt shown here is a postwar fabrication.

SANHS collection, photo by Dolf Goldsmith

(see below). Official Springfield Armory photograph no SA-058-2001/ORD-59 dated December 8, 1959 titled "*Gerät 06H/StG 45 (Mauser)*", showing *Gerät 06H/StG45(M)*

serial no 2 field-stripped.

The return spring guide (fig 61) is shown upside down, and the trigger group is positioned back to front.

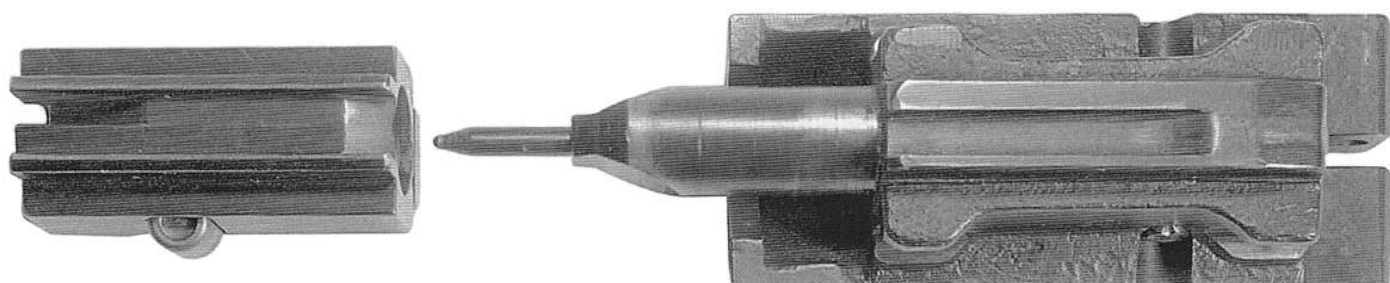
courtesy John McCabe





59. Left side closeup of *Gerät* 06H/StG45(M) serial no 2, showing number "2" stamped on magazine housing. The only other markings are to indicate the selector positions "D" (*Dauerfeuer*; automatic fire) "E" (*Einzelfeuer*; single fire) and "S" (*Sichert*; safe).

SANHS collection, photo by Dolf Goldsmith



60. Underside view of the bolt assembly of *Gerät* 06H/StG45(M) serial no 2, showing the bolt head with rollers at left, and the bolt carrier, carrying the *Steuerstück* and firing pin at right.

Note the machining of the bolt carrier has been kept to a minimum, allowing the non-critical surfaces to remain in their rough forged state.

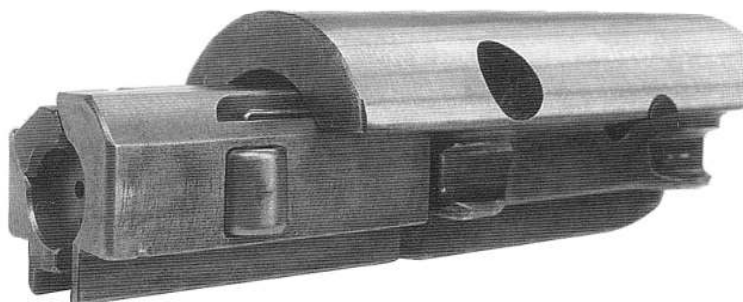
SANHS collection, photo by Dolf Goldsmith

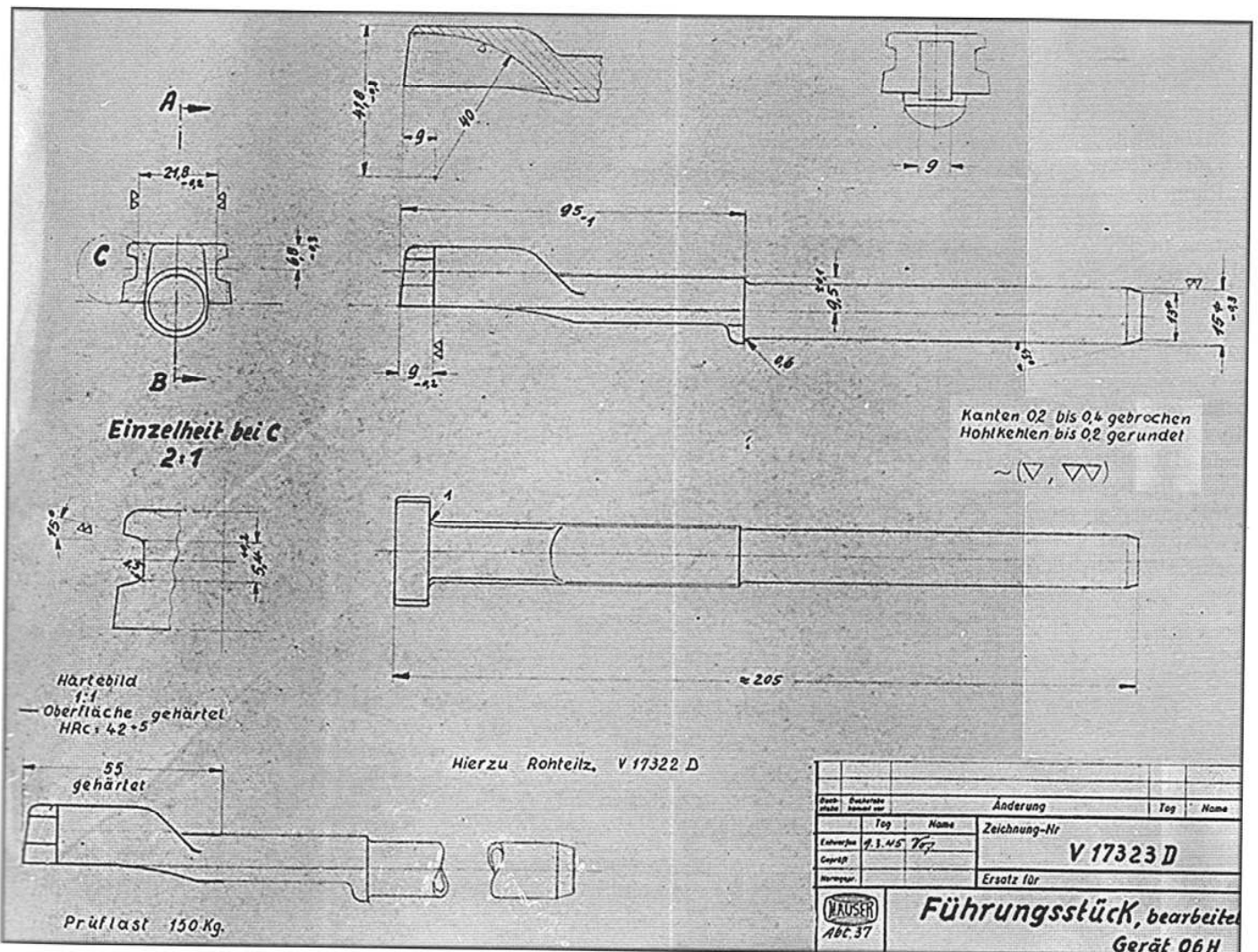
Interestingly, the only virtually complete StG45(M) known to exist today is serial no 2, whose one non-original component appears to be a replacement

61 (right). Left front three-quarter view of the bolt assembly of the *Gerät* 06H, with all components assembled.

Note the final angled position of the extractor, as shown in the drawing in fig 49.

SANHS collection, photo by Dr Geoffrey Sturgess





62. Mauser Gerät 06H drawing no V17323D dated March 4, 1945, titled *Führungsstück, bearbeitet* (return spring guide, finished).

The view at bottom left clearly indicates that the return spring guide tube is hollow. Dr Maier in his correspondence estimated the weight of this component at approxi-

mately 150g (6 oz). The return spring guide in StG45(M) serial no 2 is solid, and researcher Mike LaPlante has recorded its weight as 276.1g (9.74 oz). The heavier solid guide might have been a last-minute attempt by Mauser engineers to counteract the problem of out-of-battery firing due to "bolt bounce".  
courtesy Walter Schmid

buttstock. This rare arm resides today in the collection of the Springfield Armory National Historic Site (SANHS) in Springfield, Massachusetts, along with

several incomplete sets of the main stamped and machined components which were found on the Mauser train.

## Dr Maier Authenticates Serial No 2: "A Treasure in Your Collection"

Regarding StG45(M) serial no 2, Dr Maier commented to SANHS Objects Curator John McCabe in his letter of July 16, 1996:

. . . Your rifle is indeed one of the latest Mauser models, with retarded blowback action (no gas

piston) and a fluted cartridge chamber for the German 7.92mm short cartridge (Kurzpatrone) .

One thing is sure. This rifle is a treasure in your collection . . .



## 64 The Final Legacy of the "30 Parts Sets"

63 (right). The 10-round magazine, shown above fitted to *Gerät 06H/StG45(M)* serial no 2, stripped.

Left: follower and shortened spring.

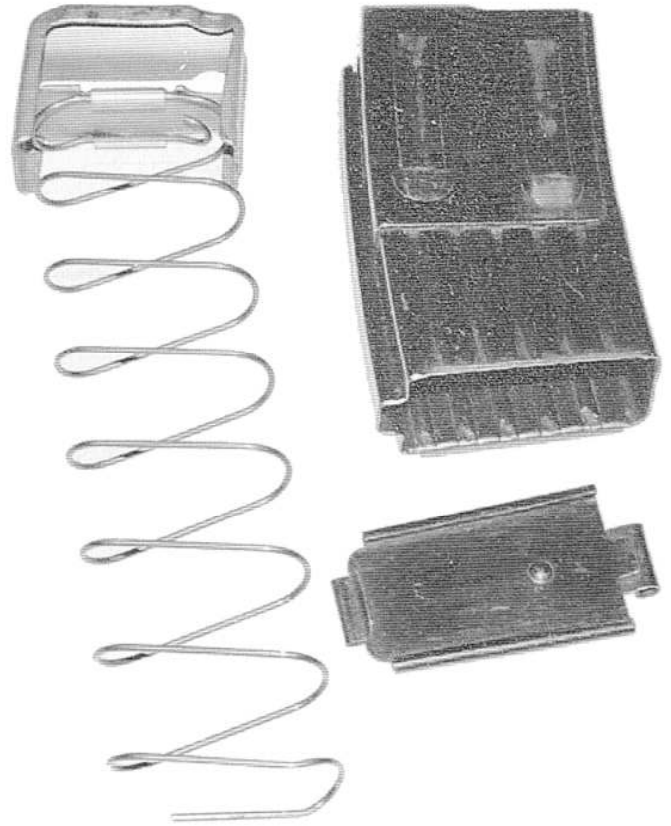
Right: magazine body and floorplate.

This magazine body is coded "chn", indicating manufacture by the Reinhold Brothers Maschinenfabrik und Eisengießerei, Gera.

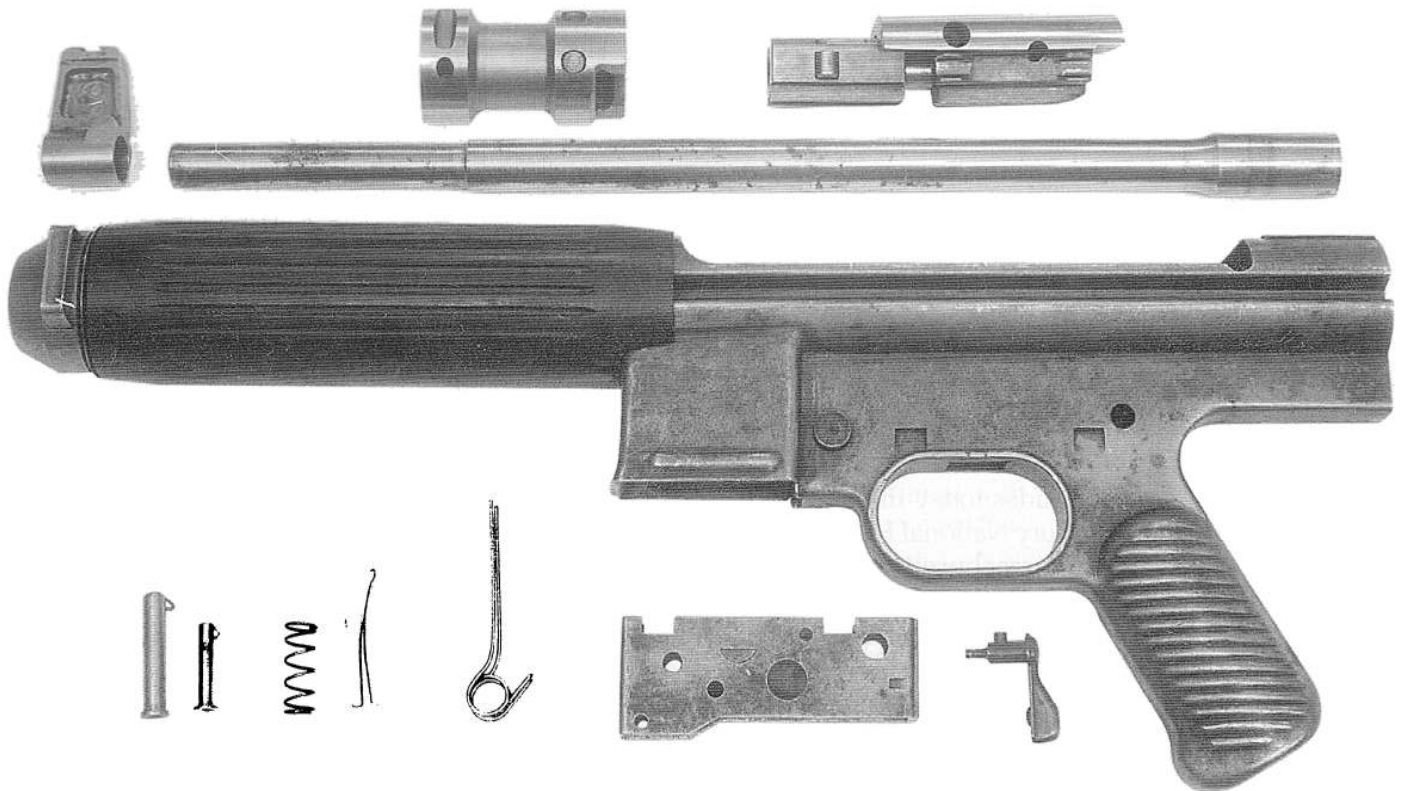
An examination of the magazine body indicates that at some time it was shortened by hand from an original 32-round magazine body.

The StG44 magazine assembly, short or long, actually comprises nine components. The follower assembly has three pieces, the follower and spring clip, which are spot-welded together, and the spring. The magazine body comprises three pieces, the body itself and the two top reinforcing plates welded one on each side. The floorplate is also a three-part assembly, made up of the floorplate, the spring-steel locking plate, and its rivet.

SANHS collection, photo by Mike LaPlante



## The Final Legacy of the "30 Parts Sets"

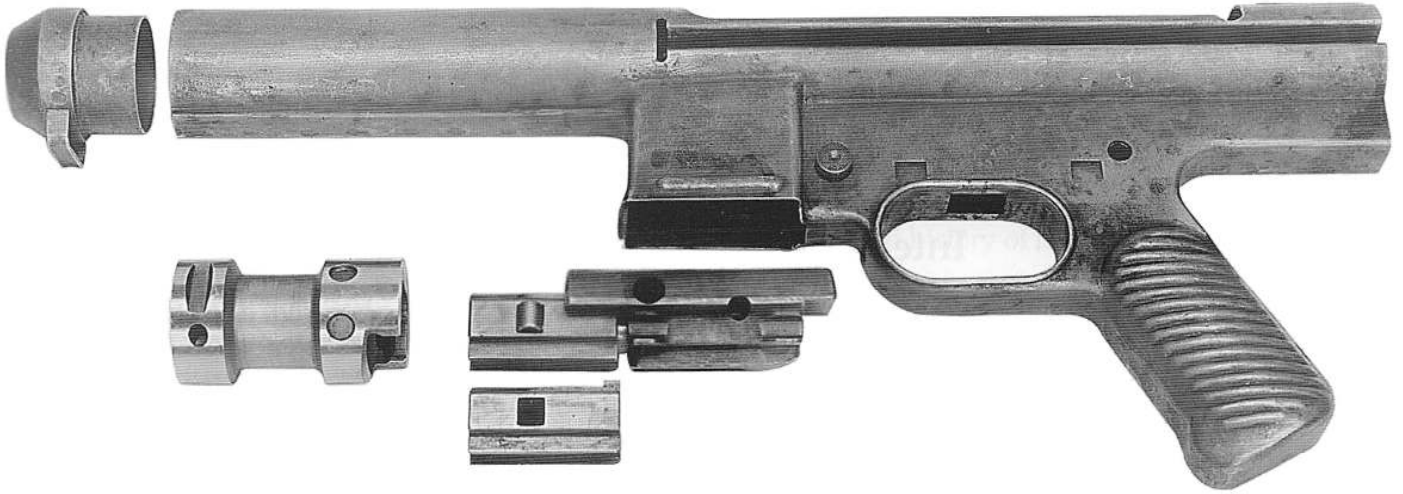


64. Left side view of an unnumbered and unassembled set of parts for a *Gerät 06H/StG45(M)*.

This set is more complete than most and includes (from top left) the following components: front sight base; barrel; barrel extension; bolt assembly; receiver casing with Tuffnol forearm and nose cap; two locking pins, magazine

catch spring, hammer spring; trigger assembly housing; change lever.

A comparison with the complete gun, serial no 2, and the other parts sets shown below indicates that even at this late date some minor modifications were still being introduced. SANHS collection, photo by Dr Geoffrey Sturgess



65. Left side view of a further parts set, even less complete than that shown in fig 63.

From left: nose cap, receiver casing; barrel extension; bolt assembly and spare bolt head.

SANHS collection, photo by Dolf Goldsmith



66. Left and right side views of all that remains of a further Gerät 06H parts set, consisting only of a receiver casing, dust cover and butt ferrule.

SANHS collection, photo by Dolf Goldsmith

## A Modern Revelation: the StG45(M) Solid Model by Dieckmann True Position, Inc

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67. A product of the solid model technique is this left side "glass" or "phantom" view of the *Gerät 06H/StG45(M)*, with all components assembled except the handguard, which is shown laid aside to better show the details of the method of securing the barrel and barrel extension in the receiver.

© Ralf Dieckmann,  
Dieckmann True Position, Inc

The German-born arms designer Ralf Dieckmann, owner of Dieckmann True Position, Inc of Prescott, Arizona, has the enviable distinction of being completely fluent in both German and English, not only in the language of literature and everyday affairs, but of the sometimes mystifyingly complex terminology reserved for the technical description of arms components and their functions. He has also had a re-

markable career, working as a designer for Heckler & Koch in both Germany and the USA, serving a stint in the Artillery Corps of the Canadian Army, working for Sturm, Ruger for a number of years, and developing several unique arms designs of his own, in a range of calibres from .22 rimfire to .50 Browning.

As an adjunct to his arms designing activities, one of Mr Dieckmann's pastimes is the creation of



68. An enlargement of the central portion of the phantom view in fig 67 shows the action components of the *Gerät 06H/StG45(M)* in greater detail.

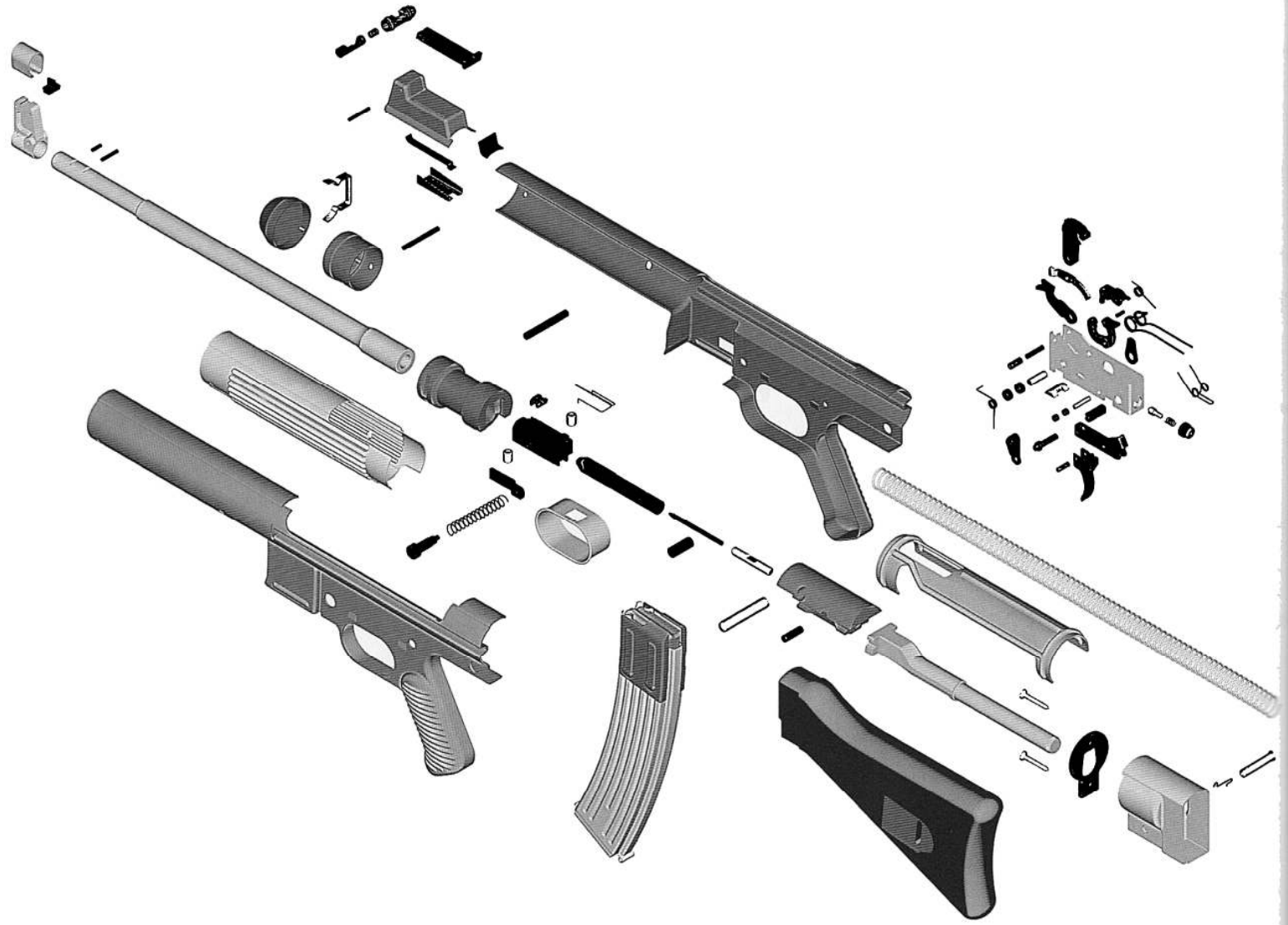
From left: the barrel, with fluted chamber, pressed into the barrel extension and secured by a transverse pin; the bolt, in its forward position with rollers extending into their recesses in the barrel extension; and the hammer in the fired position. All the components within the trigger housing "box" are clearly visible, within the hollow "clamshell" formed by the two stamped halves of the pistol grip.

© Ralf Dieckmann, Dieckmann True Position, Inc

"solid models"—computer-generated, 3-D depictions of interesting modern arms complete with all their componentry—which he painstakingly recreates from original blueprints and manufacturing drawings to ensure that the dimensions and position of each and every component are absolutely correct in every plane. Once rendered, these virtual depictions can be rotated into any conceivable position to produce solid or phantom views, the latter showing much more see-through detail than could ever be achieved by cutting away metal from an original set of parts. The solid model depictions of each component can also be separated or "exploded", as shown below, and these individual renderings are accurate enough to be measured and used as a basis for manufacture.

Mr Dieckmann has kindly consented to add the *Gerät 06H/StG45(M)* to his list of solid model projects, and some of the intriguing results are displayed here.

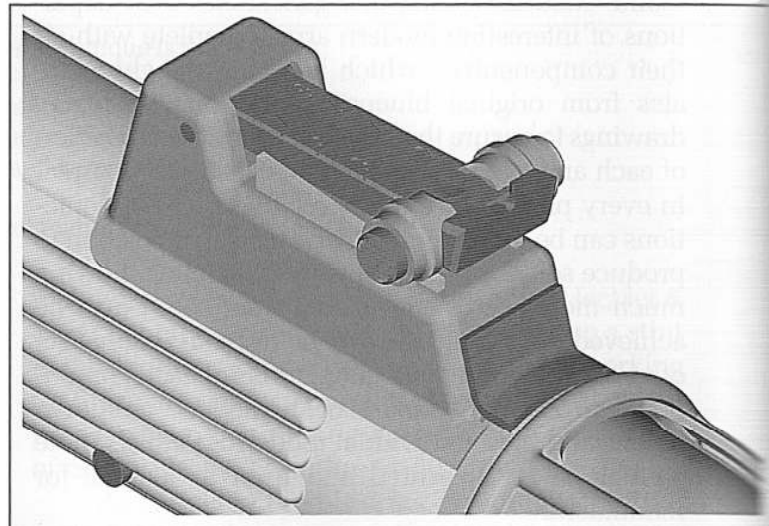
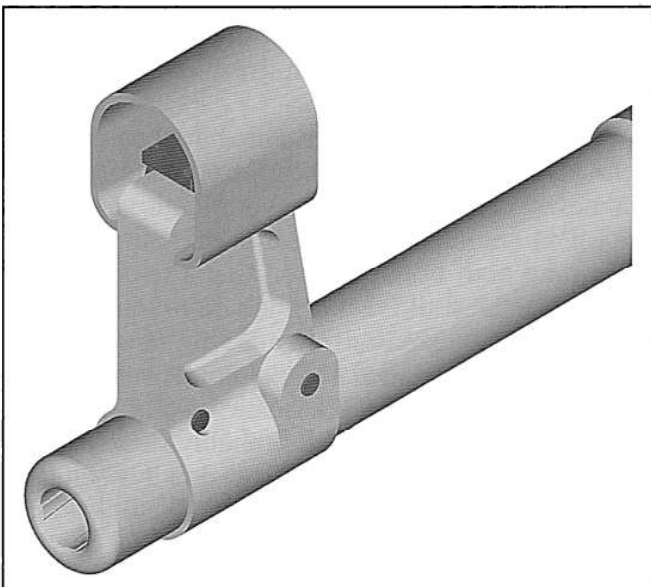
Over the past few years there have been intimations from companies in both Europe and America that newly manufactured semi-automatic versions of the MP44 are in the works. Mr Dieckmann and the author are both of the opinion that a re-creation of the *Gerät 06H* would make much more sense, either in its original 7.92x33mm chambering, or perhaps in the more readily available 7.62x39mm. In either case, the completion of Mr Dieckmann's solid model of this rare arm means that the reliably dimensioned groundwork for such a project has already been laid.

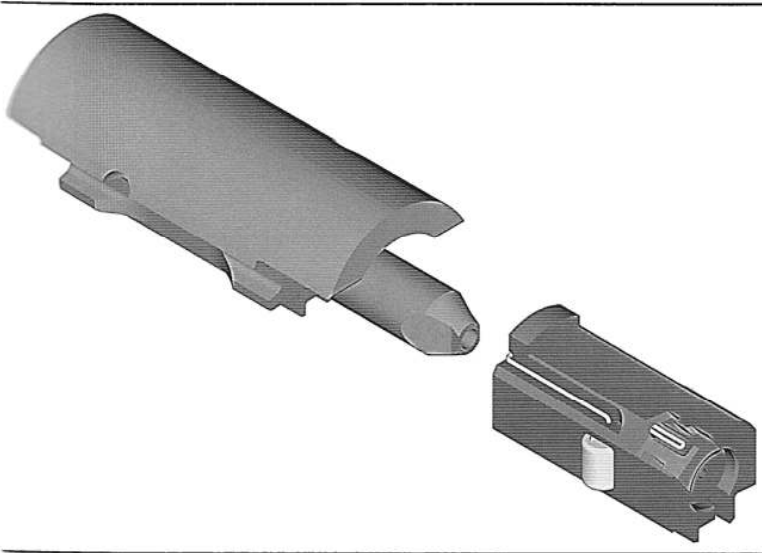


69. A left side exploded view of the solid model of the *Gerät 06H/StG45(M)*. Here all 77 components are rendered in their solid form.

Note the two stamped “clamshell” halves of the receiver.

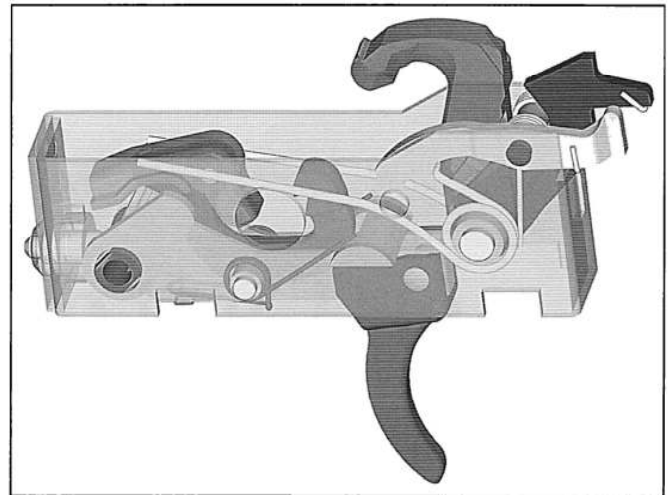
© Ralf Dieckmann,  
Dieckmann True Position, Inc





72. The bolt head carrier and the *Steuerstück* (steering piece), left, and the bolt head assembly of the *Gerät 06H/StG45(M)*, solid-modelled.

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73. A right side view of the components of the trigger box, shown solid-modelled in position within their stamped housing. This entire unit is inserted within the hollow “clamshell” formed by the two stamped and spot-welded halves of the receiver/pistol grip, where the four cutouts (the two on the right side being visible here) position the housing on tabs stamped into the receiver (shown in fig 54). The housing is then retained by the shaft of the selector.

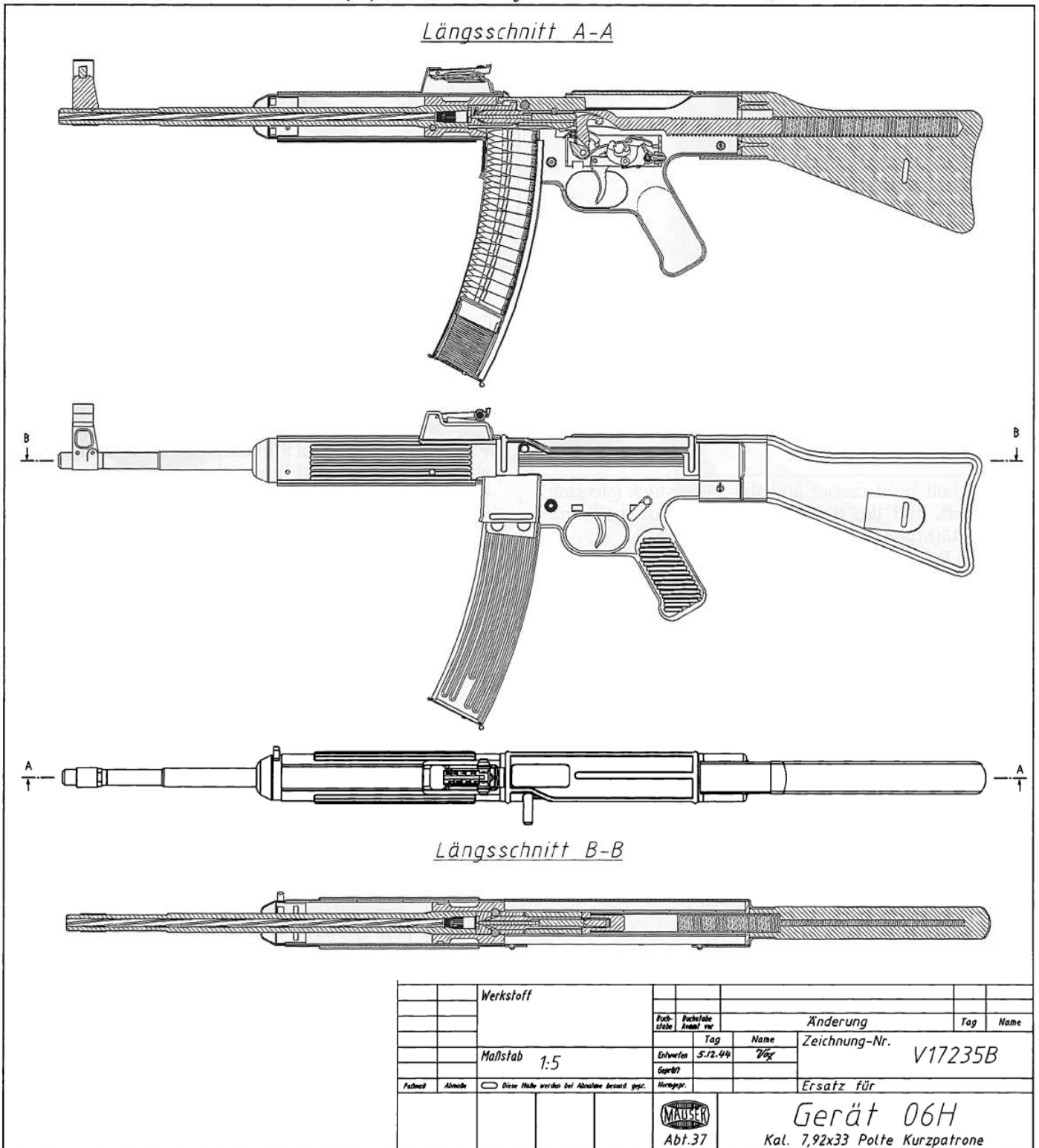
© Ralf Dieckmann, Dieckmann True Position, Inc

74. (left, preceding page). The front sight assembly and muzzle of the *Gerät 06H/StG45(M)*, solid-modelled.

© Ralf Dieckmann, Dieckmann True Position, Inc

75. (right, preceding page). The rear sight assembly of the *Gerät 06H/StG45(M)*, solid-modelled.

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74. Another by-product of the solid modelling process is this set of drawings of the *Gerät 06H/StG45(M)*. Note (below) even the title block has been reproduced, exactly as it would have been on the original drawing.

Top: left side view sectioned along the line A - A.

Second from top: outside view showing line of section B - B.

Second from bottom: top view showing line of section A - A.

Bottom: top view sectioned along the line B - B, shown above.

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Dieckmann True Position, Inc

## Chapter Five

# A Last Twist to the Tale

## The V-20 Saga



75. Left and right side views of StG45(M) serial no V-20. The story of how this genuine but incomplete parts set was made into a finished rifle after the war is told in the text. Compare with fig 57.

Dr Geoffrey Sturgess collection and photographs

**T**he late Henk Visser, the erstwhile head of the Dutch arms and ammunition firm Nederlandse Wapen- en Munitiefabriek NV (NWM), will figure prominently in the story of the postwar roller-locked CETME rifle in the Netherlands (Chapter Fourteen). Mr Visser was of the opinion that a total of 19 sets of StG45(M) components were indeed assembled, at Eschede. The story as he told it is that the 20th set, with a complete bolt assembly but missing some minor parts, was sold shortly after the war by “an American colonel” to the US arms dealer Martin B Retting, who later sold it to the noted collector Bob Rubendunst. It was then acquired by

Mr Visser, who had the missing parts fabricated according to available drawings at Oberndorf, using the facilities of both the postwar Mauser R & D department and Heckler & Koch.

According to Mr Visser, this process took “fifteen years and many bribes”, during which copies of the missing trigger component drawings were acquired from the British Quality Assurance Directorate. Mr Visser was also allowed to borrow the *Gerät 06* held in the MoD Pattern Room collection in order to copy the remaining missing parts which were identical in both models.

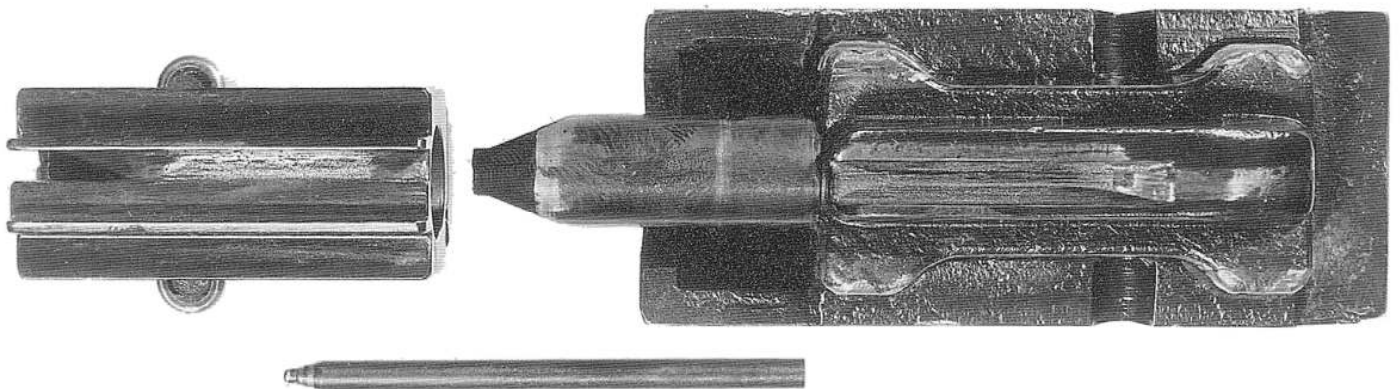




76. Left side closeup of StG45(M) serial no V-20, showing the serial number and Mauser Banner markings which were added at Mr Visser's direction after the arm was completed.

Compare with fig 59.

photo courtesy the late Henk Visser



77. Underside view of the bolt assembly of StG45(M) serial no V-20.

Compare with fig 60: these views, and the components shown, are nearly identical except that here the firing pin has been removed from the *Steuerstück*.

Dr Geoffrey Sturgess collection and photograph

In the belief that nineteen sets of parts had already been assembled, Mr Visser accordingly had

the receiver of the 20th set marked with the Mauser Banner and the serial number "V-20".

Some time after this arm was completed Mr Visser sold it to the noted British collector and WWII German arms historian Dr Geoffrey Sturgess, in whose vast collection it remains today.

Excerpts from Dr Maier's 1996 letter to John McCabe concerning a detailed examination of the V-20 rifle are as follows:

*. . . John Cross, who as a gunsmith has an intimate knowledge of the Mauser retarded blowback rifle design, examined the V-20 rifle and took some detailed measurements. He found that the chamber has 18 longitudinal flutes to ease extraction of*

*the 7.92x33mm kurz cartridge case. The angle on the steering piece was measured at 22°, and the angle in the receiver was found to be 45°. The weight of the bolt head plus rollers was 85 grams; the weight of the bolt carrier was 400 grams, and the weight of the spring guide was 151 grams.*

*In this design, the spring guide moved with the bolt carrier and its weight must be added to that, resulting in a combined mass of 551 grams. These measurements give an exact definition of the Mauser retarded blowback roller locking system, and I am inclined to believe that this rifle was truly one of the 30 StG45(M) part sets.*

## A Really Rare Reich Relic: the Vollmer-Made "Gerät 06H"



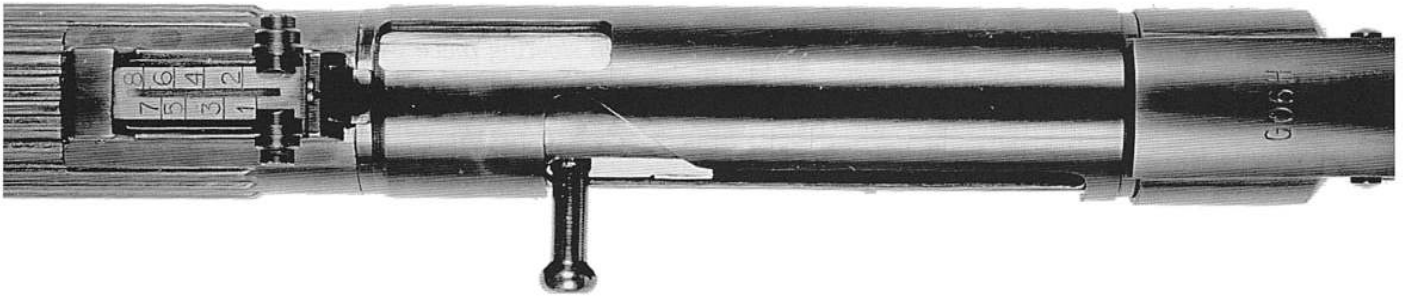
78. Left and right side views of a Vollmer "Gerät 06H", which research has proven was a postwar confabulation. BWB collection, Koblenz, courtesy Walter Schmid

Excerpts from Dr Maier's letter to John McCabe conclude with the following interesting comments concerning a pair of "Gerät 06H" rifles proudly held in the Bundesamt für Wehrtechnik und Beschaffung (BWB) collection in Koblenz:

*I found out that these two rifles were bought from the private arms collection of Herrn Heinrich Vollmer, a former factory owner and arms inventor. His son, Udo Vollmer, sold these two rifles to*

*the museum at Koblenz after his father's death, perhaps around 1985. These two rifles have long been thought by several gun historians to be the true final design of the StG45(M)—two of the set of 30.*

*We come now to the book The German Assault Rifle 1935 - 1945 by Peter R Senich, specifically the section titled "The Mauser System" on pages 153 to 161. Most of his writings and illustrations refer to the Gerät 06, a conventional gas-operated rifle which is not so much of interest here except*



79. Top closeup of the Vollmer "Gerät 06H", showing marking "G06H" stamped on top of the buttstock ferrule. courtesy Walter Schmid



80. Left side closeup of the action of one of the two Vollmer "Gerät 06H" rifles.

A comparison with figs 59 and 76 reveals several anomalies, among the most egregious of which are the wooden grip panels and the relocated selector, which now moves rearward through a rearranged sequence of positions.

Ralf Dieckmann, the producer of the *Gerät 06H* solid

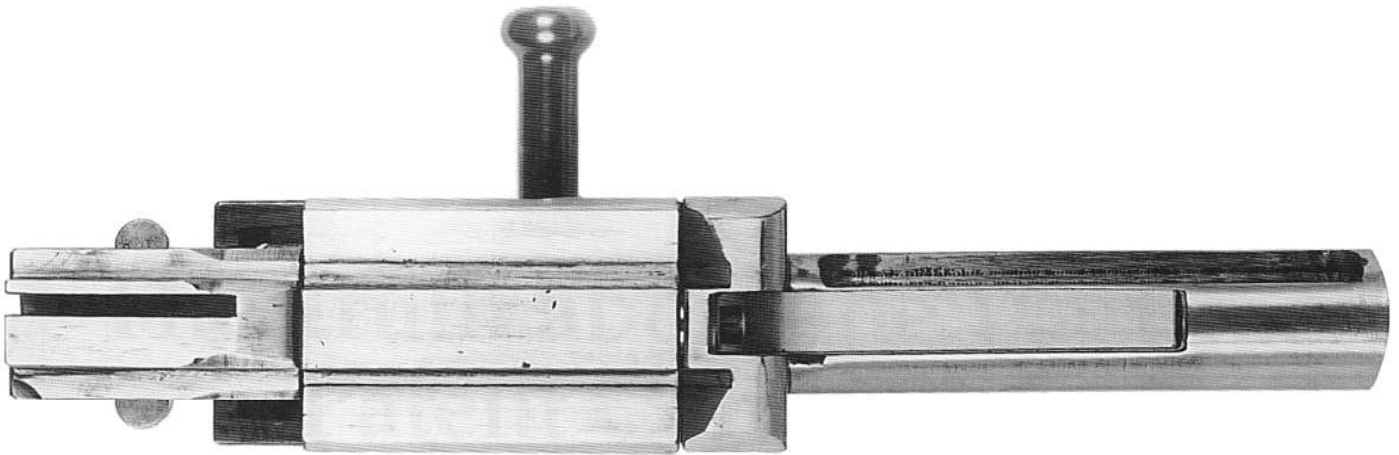
model depicted on the jacket and in Chapter Four, examined one of the Vollmer fakes while he was visiting the BWB Museum in Koblenz and reports noticing file marks on some components which were ostensibly made of sheet metal. He found this odd, and investigated further to find that some parts were actually machined from solid steel, and then hollowed out to resemble stampings.

courtesy Walter Schmid

*as a forerunner to the later retarded blowback type. Only six photographs, figs 211 to 216, refer to the Gerät 06H or the StG45(M). [Figs 215 and 216 are of the V-20 rifle, discussed above.]*

*Regarding the rifle model 06H shown in photographs 211 to 213 of Mr Senich's book, these depict the two examples of this rifle in the arms museum at Koblenz. Mr Visser and the well-known British arms expert and gunsmith John Cross visited the*

*arms museum at Koblenz in September, 1995, and arrived at the conclusion that these two rifles were probably manufactured by Heinrich Vollmer well after the war, for his own collection, using some Heckler & Koch parts of much later and heavier design. The angle on the steering piece was measured to be 35°, and the angle in the receiver was 45°. Mr Cross had brought along the original bolt parts of the V-20 rifle, which did not fit the Koblenz*



81. Underside view of the bolt assembly from one of the Vollmer "Gerät 06H" rifles.

Compare with figs 60 and 77: the manufacturing differences between the wartime originals and this postwar copy are clearly visible. courtesy Walter Schmid

*rifles and appeared to be much lighter. Fig 212 also shows a different spring guide which appears to be either a one-piece guide supported on the receiver, or a two-piece telescopic guide, with the front part moving with the bolt carrier. Furthermore the year "1943" stamped on the receiver makes no sense,*

*since there was no Mauser retarded blowback rifle shooting before the summer of 1944. Therefore the conclusion stands: the Vollmer rifles at Koblenz do not belong to the 30 sets of StG45(M) parts available at Oberndorf in the spring of 1945.*

## The Devil's Advocate: "Compared to What?"

As we have learned, there is only one genuine example of an almost completely original *Gerät 06H*/StG45(M) known to exist today, and that is serial no 2, held in the Museum of the Springfield Armory National Historic Site in Springfield, Massachusetts.

It is quite possible that the staff of the BWB Museum in Koblenz were totally unaware of the existence of serial no 2 when Udo Vollmer came to call with his father's two purported "Gerät 06H" rifles, and therefore they had absolutely nothing to use as a benchmark to confirm the originality of the Vollmer offerings. Without such a comparison being available there is indeed little that would have indicated to anyone that the Vollmer rifles were of post-war construction, and the Museum staff must have

congratulated themselves on the excellent condition of these rare finds.

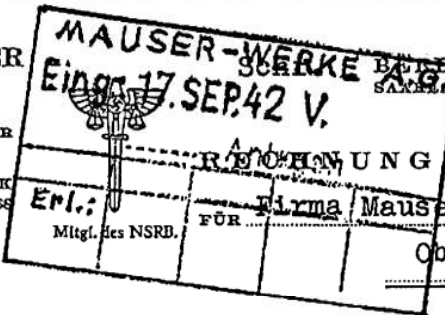
The sum paid to Udo Vollmer for these and several other spurious rifles was quite substantial indeed, and the subsequent revelations as recorded above were understandably not happily received nor widely broadcast.

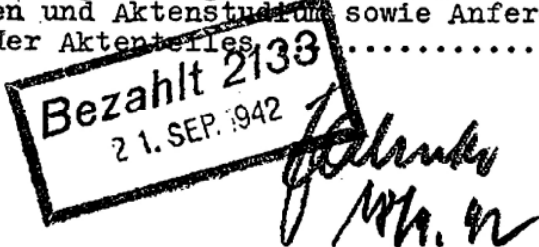
One of the few reactions to the unmasking of these two fakes, hitherto thought by many to represent the "true final design of the StG45(M)", was that the BWB Museum has donated one of the pair to the Oberndorf City Museum, of which Walter Schmid was formerly the curator, where it is now on display and labelled as the genuine article.

Chapter Six

# The Truth about the Wartime Patent Controversy

## A Close Look at the Mauser Claims

<p>PATENTANWALT DR.-ING. ERNST MAIER</p> <p>FERNSPRECHER: 19 05 33 TEL.-ADRESSE: PATENTSENIOR</p> <p>PATENT-CODE</p> <p>BANKKONTO: DEUTSCHE BANK DEP.-KASSE O, BERLIN SW 68</p> <p>POSTSCHECKKONTO: BERLIN 178388</p>		<p>15. Sept. 1942</p>										
<p>A. 261/42</p> <hr/> <p>Betr.: deutsche Patentanm. M 149 001 XI/72h "Rollenschloss" - Ihr Zeichen: 31-L/V 191.</p> <hr/> <p>Vertretung im Anmeldeverfahren</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 80%;">1. vor der Prüfungsstelle .....</td> <td style="width: 20%; text-align: right;">RM 70.--</td> </tr> <tr> <td>2. vor dem Beschwerdesenat .....</td> <td style="text-align: right;">" 70.--</td> </tr> <tr> <td>amtliche Beschwerdegebühr .....</td> <td style="text-align: right;">" 20.--</td> </tr> <tr> <td>Ausarbeitung der Beschwerdebegründung einschliesslich Schreibgebühren und Kopien und Aktenstudium sowie Anfer- tigung einer Abschrift der Aktenunterlagen .....</td> <td style="text-align: right; vertical-align: bottom;">77.30</td> </tr> <tr> <td></td> <td style="border-top: 1px solid black; text-align: right;">RM 237.30</td> </tr> </table>			1. vor der Prüfungsstelle .....	RM 70.--	2. vor dem Beschwerdesenat .....	" 70.--	amtliche Beschwerdegebühr .....	" 20.--	Ausarbeitung der Beschwerdebegründung einschliesslich Schreibgebühren und Kopien und Aktenstudium sowie Anfer- tigung einer Abschrift der Aktenunterlagen .....	77.30		RM 237.30
1. vor der Prüfungsstelle .....	RM 70.--											
2. vor dem Beschwerdesenat .....	" 70.--											
amtliche Beschwerdegebühr .....	" 20.--											
Ausarbeitung der Beschwerdebegründung einschliesslich Schreibgebühren und Kopien und Aktenstudium sowie Anfer- tigung einer Abschrift der Aktenunterlagen .....	77.30											
	RM 237.30											



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82. An invoice from Mauser's patent attorney *Dr-Ing Ernst Maier* in Berlin (not to be confused with the Mauser mathematician *Dr Karl Maier*) dated September 15, 1942, regarding fees for submitting a new justification for the refused patent application no M149 001 XI/72h, titled *Rollenschloss* (roller action).

This proves that Mauser had applied unsuccessfully for a (rigid) roller lock patent as early as 1942.

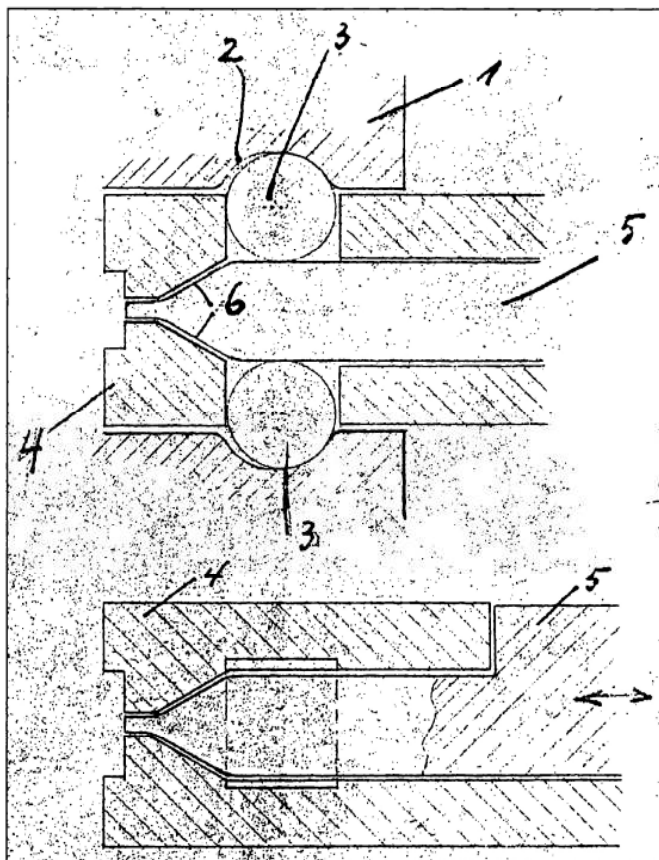
courtesy Jon Speed

Much has been written, particularly by Dr Maier in his later years, to the effect that after the war the Mauser firm was somehow cheated out of its rightful place as the inventor, not to say the patented owner, of the half-locked roller action. The real truth about this murky story has been difficult to

ascertain after all these years, but what follows has been pieced together thanks largely to the diligence and assistance of two eminently qualified researchers, Dr Geoffrey Sturgess and Hans-Dieter Handrich.

### The CIOS List of Relevant Mauser Patent Applications

The early postwar CIOS report titled "Visit to Mauser Werke AG Oberndorf am Neckar and Mauser Personnel at Lager Haiming, Ötztal, near Innsbruck", originally a Secret document several hundred pages in length, contains among many other things an exhaustive nine-page listing of Mauser patent specifications. Among these, the following deal with aspects of the StG45(M) and the roller locked action:



83 (right). Drawing from the disclosure of Mauser patent application no V318, titled "Lock mechanism for fire arms", covering the fully-locked roller action.

This patent was not granted by the RPA, who on November 22, 1944 cited Siemens patent no 582 097 (fig 6) as prior art. courtesy Dr Geoffrey Sturgess

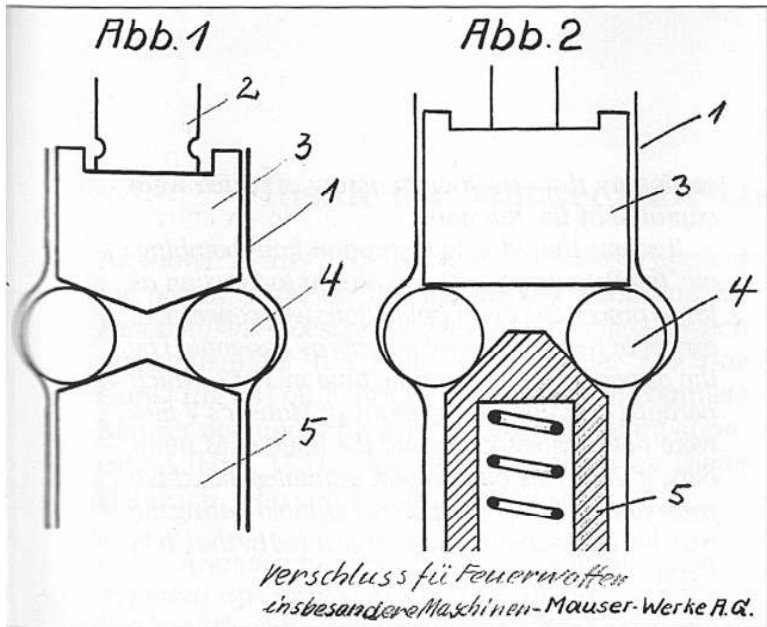
Date	Patent No	Translation of Title
January 4, 1943	V318	Lock mechanism for fire arms
February 16, 1944	V354	Breech mechanism for fire arms - in particular Machine Guns
February 22, 1944	V355	Breech for automatic fire arms with split roller locking
April 7, 1944	V360	Breech with rollers between breech block and breech housing as a means of locking
April 20, 1944	V363	Barrel in two parts
April 27, 1944	V371	Production of grooves in the cartridge chamber
May 3, 1944	V365	Muzzle brake

The above list indicates that Mauser definitely took steps to protect both iterations of the roller lock action—the fully-locked gas-operated version and the later "half-locked" type—with patents.

Many have inferred that the fact that these patent applications were given V numbers is a clear indication that the patents were actually granted. However, as Dr Sturgess points out, after examining

the contents of numerous wartime patent application files, things were not quite so simple:

. . . The V-numbered files were the internal patent application file numbers, the "V" being the internal Mauser code letter referring to the Waffenforschungsanstalt ("Versuch").



84. Drawing from the disclosure of Mauser patent application no V354, titled "Breech mechanism for fire arms - in particular Machine Guns", depicting the half-locked roller action.

This application was not accepted by the RPA, and a corresponding patent was not granted.  
courtesy Dr Geoffrey Sturgess

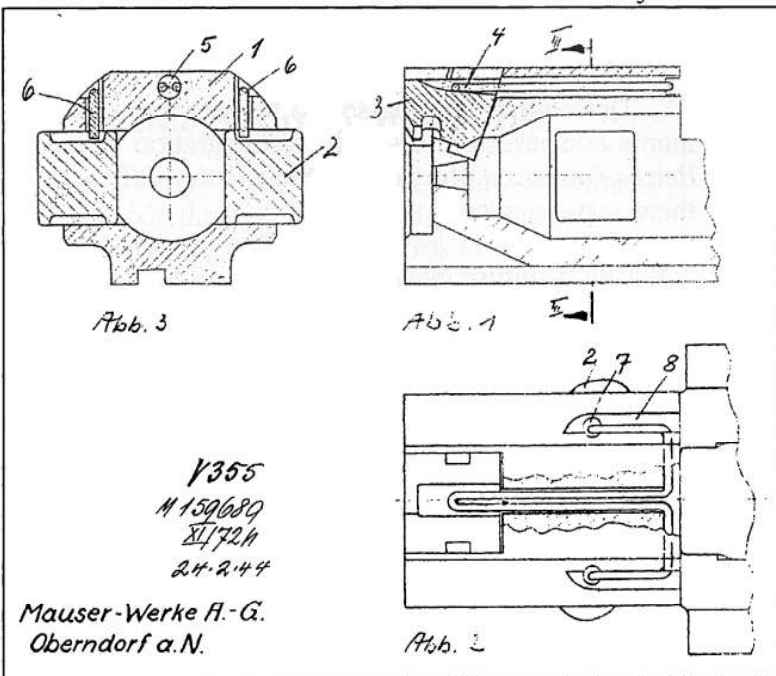
The [complete patent application] files contain (some of, not all are complete) the internal Mauser forms justifying the application and the inventor's draft patent specification and drawings, together with the correspondence with the patent office and receipts for fees, etc, together with the correspondence concerning the development of the application, the issue by the patent office of the Meldungsnummer (the "M"-prefix six-digit number signifying registration of the application for official consideration), technical correspondence concerning challenges to the application (prior art, etc), and correspondence between Mauser and the Army/Navy/Luftwaffe, following the application to the patent office, checking whether the application was to be treated as secret.

None of the V files I have contain a grant of patent, so they seem all to be open files for applications in progress at the end of the war.

The lists in the CIOS report are [mainly] of two groups, entitled Mauser Patent Specifications DRP Book 1 and 2, which are mostly granted patents with six-digit patent numbers in the 5xx, 6xx and 7xx xxx chronological sequence covering the pe-

## Bomb Damage Disrupts the Patentamt: Many Patents Not Granted

Mauser Aktennotiz Nr 3641, reporting on developments of the Weapon Research Establishment during the month of June, 1944, contains the following preliminary remarks concerning activities of the Mauser Patent Department:



85. Drawings from Mauser patent application no V355 dated February 2, 1944 titled "Breech for automatic fire arms with split roller locking", showing rollers retained by the ends of a single wire spring which is also configured to act as the extractor spring.

Compare with fig 49: the extractor was later relocated from the vertical position shown here to an approximate 45° angle on the face of the bolt head.

courtesy Walter Schmid

riod from the early 1930s to 1942. [These six-digit numbers are] followed by a "/" and the Patent Class, mainly 72a and 72h. (Class 72 covered firearms, ammunition and entrenchment, including weapons and accessories.) Some listed in Book 2 however are registered applications with M-prefix numbers (which are not the same as the eventual patent number if granted), and also the corresponding V file number. The third list, entitled Miscellaneous in the report, is of the V files, though the allocation of the files between the lists seems inconsistent . . . Some of the V file numbers (V207, V225 and V226) are also listed both in Book 2 (with M numbers) and in the Miscellaneous list: I suspect that there is a considerable amount of the fog of war in the CIOS report, which was written and published very much on the hoof, without careful editing . . .

. . . The recent damage to the State Patent Office - where above all a great part of the material of the weapon class arrives in a disorganised state - has further paralysed the examining activities of the State Patent Office, in the matter of our patent registrations deposited [there] . . .

Dr Geoffrey Sturgess continues with more comments concerning the steady disintegration of the *Reichs Patentamt* (the German State Patent Office) as the war progressed:

. . . BIOS [British Intelligence Objectives Subcommittee item] 795 describes the chaotic situation in the Patentamt in mid-1945, with many specifications destroyed by bombing, the main library in Berlin destroyed in 1942 and what remained being dispersed to the salt mines at Heringen and other

secondary dispersal points, many of which were captured by the Russians.

It seems that, due to disruption from bombing, etc, the Patentamt virtually ceased to function as far as processing new applications was concerned, except in regard to secret patents as designated by the armed forces, from some time in 1943, which perhaps explains why so many of Mauser's V files were not progressed beyond the issue of M numbers, if that. This BIOS report estimates that there were some 3,000 secret patents granted during the war, but only some 122 were recovered by the CIOS team . . .

## Examining the Wartime Patent Process

The prizewinning military historian Hans-Dieter Handrich has kindly looked into this matter, and reports as follows:

. . . It may be true that due to air raids the Reichs Patentamt (RPA; the State Patent Office) was in a disorganised state. But it is also proven by the numerous refusals in regard to the Mauser patent applications that they were still taking their job very seriously. One must also consider the "patent policy" practised by firms at that time, where it was routine to apply for a patent even when it was known that a corresponding patent had already been granted to another firm. On February 11 1941, for example, Mauser applied for a patent on a self-loading rifle operated by a "doughnut" gas piston, as was later used in the MG215 [discussed above in Chapter Two], even though the firm was well aware that they would have no chance to get such a patent issued on this subject. According to an internal memorandum from Mauser Abt Vp to Abt Vs, the application was done merely to find out details of other existing patents on this subject. Of course, the Patentamt refused this application, on December 4, 1941, but granted Mauser the usual three months' grace period in order to prepare a new justification. All the relevant original documents are to be found in HEC [Halstead Exploitation Centre file no] 15273.

This is a good example of the working policy used by German firms during the war, and of the bureaucratic process involved (which took ten months in this case, and was apparently not yet hampered by air raids).

Judging from this, Mauser must have received some more three-month grace periods concerning their roller lock patent applications. Fig 82 shows a written confirmation from Mauser's patent attorney Dr-Ing Ernst Maier for the fees involved in preparing a new justification for the refused patent application M 149 001 XI/72h "Rollenverschluß" (Az Mauser: 31-L/V 191). This proves that Mauser had applied for a patent on the (rigid) roller lock as early as 1942, the application had been refused by the Patentamt, and Dr-Ing Maier then sent in an appeal, including a new justification. The refusal was most likely due to the Grossfuss roller lock patent for the MG42, discussed below, and it must be assumed that Dr-Ing Maier's appeal was also not successful.

Further, a handwritten Mauser file notice dated April 1, 1943 regarding the application for patent V318, "Lock mechanism for fire arms", states that the application was refused by the RPA. This is confirmed by a letter from Mauser to the RPA dated February 6, 1944, which states that the Mauser patent application conflicted with patent no 582 097, titled "Breech Locking Mechanism for Fire-arms", which was granted to Siemens-Schuckertwerke AG on February 14, 1929. [This early roller locked action patent is depicted and described on page 33 of Hans-Dieter Handrich's 2004 Collector Grade title *Sturmgewehr!*, and further in the Introduction to this present book.] There was apparently also a conflict with another previously granted patent, no 721 291, the particulars of which have not come to hand. A later Mauser file notice dated April 9, 1945 confirms that this patent had still not been granted by the RPA up to that time.



## Inside the Mauser Half-Locked Roller Action Patent File

As shown in the CIOS listing above, Mauser applied for patent V354 on the half-locked *Verschluß für Feuerwaffen, insbesondere Maschinenwaffen* (Breech mechanism for fire arms, in particular Machine Guns) (fig 84) on February 16, 1944. The complete Mauser document file concerning this patent application (HEC 15317) has been examined by Dieter Handrich, who comments as follows:

*. . . A handwritten Erfindungsmeldung (invention report) was drafted by Dr Maier on February 19, 1944. This was not accepted by Altenburger and Stähle, who must have been indignant at what they perceived as inaccuracies in Dr Maier's version of the events. This is indicated by the heavy underlining under Dr Maier's sentence ". . . later I was inspired by the model [of the semi-rigid roller lock] that was made by Mr Stähle of Abt 37."*

*The file shows that a new invention report was drafted by Stähle and countersigned by Altenburger on February 24, 1944, and this must have been the official version forwarded by Abt 37 to the Mauser patent section (Department 31) for filing with the RPA. This confirms that Stähle was considered by Mauser to be the official inventor of the semi-rigid roller lock.*

*There is no doubt that Dr Maier did all the mathematical calculations, with or without a cor-*

*responding order from Abteilung (Department) 37, but the task of Niemann's Department 35, wherein Dr Maier worked, was to assist the construction section (Department 37) by means of experimental research and theoretical calculations. Altenburger, the head of Department 37, who was a very authoritarian figure, obviously did not accept Dr Maier's claim to be considered as one of the inventors.*

This contradicts Dr Maier's postwar account of these events, included in his memoir *Zum Entwicklung des halbstarren Rollenverschlusses* dated January 16, 1995, wherein he recalled "It was not until some time in May, 1944 that I heard from Mr Niemann that a patent application for the semi rigid roller breech mechanism had been planned by the Mauser company, or had already been made, wherein Mr Altenburger, one of his engineers [Stähle], and myself were named as inventors."

Dieter Handrich concludes:

*. . . It seems that Dr Maier was kept in the dark, because according to his later letters to Walter Schmid, et al, he was convinced that he had been considered by Mauser as one of the inventors . . .*

## A Fateful Prior Claim

Despite all of the bitter and vindictive statements made after the war by Dr Maier, and Ludwig Vorgrimler's rueful account of how others were allowed to cash in on all of Mauser's hard work in developing the half-locked roller action, included in Chapter

Thirteen, the fact is that another firm, Grossfuss, had the half-locked roller action securely patented long before Mauser had even started to draft their application.

### Introducing the Grossfuss Firm

As its name implies, the firm of Metall-und Lackierwarenfabrik Johannes Grossfuss of Döbeln, Saxony was not an arms manufactory *per se*, but a firm specialising in metal stampings of all kinds. In fact, as discussed at length in the 2002 Collector Grade title *MG34 - MG42: German Universal Machineguns*, the Grossfuss firm was "completely unknown as a manufacturer of small arms" when it was contacted in 1937 by *WaPrüf2*, along with Rheinmetall-Borsig of Sömmerda and Stübgen of Erfurt, and asked to

come up with a good machine gun design constructed mainly from stamped metal parts."

Grossfuss' chief designer and, in the words of Dr Maier, its "only inventor", Dr Werner Gruner, was "without any previous experience in the small arms field, as he had never been in the Army." Nevertheless, in response to the *WaPrüf2* demand, Dr Gruner had "submitted a working model of a completely new recoil-operated bolt system with roller locking . . . The model presented consisted only of two side walls and the bolt locking system."<sup>1</sup>

The resulting MG42 was officially adopted by the German Army on October 12, 1943, and “although Grossfuss made large numbers of the

stamped parts, such as receivers, top covers, feed trays and other smaller stampings, it seems that they never assembled any complete machineguns.”<sup>2</sup>

## Translations of the Grossfuss Patents

The texts of the three Grossfuss patents, granted retroactively after the war and so objected to by Dr

Maier, appear below in translations kindly supplied by Dieter Handrich.

### Patent No 955 392

### *Massenverschluss für selbsttätige Waffen* (Mass Lock for Automatic Weapons)

*Granted under the First Transition Law as of July 8, 1949*

*(WiGBL. S. 175) [Economic Law Gazette page 175]*

*Federal Republic of Germany*

*Issued on January 3, 1957*

### Patent Document

*No 955 392*

*Category 72h Group 2 03*

*International Category F07k*

*G 11355 XI/72h*

*The Inventor has requested not to be named*

*Paul Kurt Johannes Grossfuss, Hennef/Sieg*

*“Mass Lock” [Unlocked Blowback Action] for Automatic Weapons*

*Patented in the Territory of the Federal Republic of Germany*

*Patented from June 25, 1943 on*

*The period from May 8, 1945 until May 7, 1950 inclusively is not taken into account for the duration of the patent (Ges. V. 15.7.1951) [according to the Law as of July 15, 1951]*

*Patent application announced on June 21, 1956*

*Patent granting announced on December 13, 1956*

*The invention is in the field of blowback actions for automatic weapons.*

*As everyone knows, there exist different kinds of actions for automatic weapons. First of all there exist two main groups, namely the locked action and the blowback action. The locked action for example is used in the MG42. The bolt is connected firmly with the barrel at least until the bullet has left the barrel. Then the impact of the powder gases*

*on the bolt stops. Unlocking has to be achieved by other means, i.e. by the rearward movement of the barrel caused by recoil.*

*In the case of the [unlocked] blowback action, which is used by the new German submachine gun for example, the rear end of the cartridge chamber is closed by a bolt guided by sliding surfaces. The bolt itself has no locking devices. The support of the cartridge base against the effects of the gas pressure*

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1 MG34 - MG42: German Universal Machineguns p 120

2 Ibid, p 133

BUNDESREPUBLIK DEUTSCHLAND



AUSGEGEBEN AM  
3. JANUAR 1957

DEUTSCHES PATENTAMT  
PATENTSCHRIFT

Nr. 955 392  
KLASSE 72h GRUPPE 203  
INTERNAT. KLASSE F 07k  
G 11355 X1/72h

Der Erfinder hat beantragt, nicht genannt zu werden

Paul Kurt Johannes Grossfuss, Hennef/Sieg

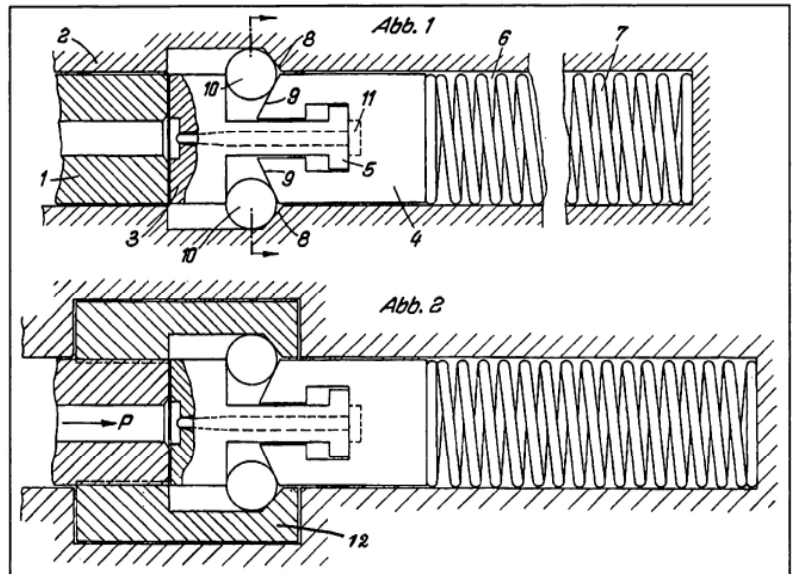
Massenschluß für selbsttätige Waffen

Patentiert im Gebiet der Bundesrepublik Deutschland vom 20. Juni 1943 ap  
Der Zeitraum vom 8. Mai 1945 bis einschließlich 7. Mai 1950 wird auf die Patentreue nicht angerechnet  
(Ges. v. 15. 7. 1951)  
Patentanmeldung bekanntgemacht am 21. Juni 1956  
Patenterteilung bekanntgemacht am 13. Dezember 1956

86. The title page of patent document no 955 392, translated on the previous page. As noted, the inventor, Dr Gruner, "has requested not to be named".

This patent application was announced on June 21, 1956, and granted to Paul Kurt Johannes Grossfuss on December 13, 1956 covering the period from June 25, 1943 on, but excluding the period from May 8, 1945 until May 7. 1950. courtesy Walter Schmid

is caused by the energy that is necessary to accelerate the bolt for its backward movement. It follows that in case of the blowback action the cartridge case glides back out of the chamber a short distance while the bullet is still passing through the barrel. By this the bolt is accelerated from its resting position to a backward movement. Thus, the bolt that receives its kinetic energy directly from the gas pressure can cause the further operational sequence of the automatic weapon. The quantity of the mass necessary to act as a breechblock depends on the powder charge and the barrel length. In general this mass would be too high for a light MG because of the increased weight. Additionally the movement of the bolt mass must be reversed at the end of its backward movement, which requires a buffer device. A higher quantity of mass requires a higher buffering. The higher the bolt mass, the higher the recoil acting on the gunner. Therefore, in order to profit from its advantages, which are the elimination of special driving devices like a barrel recoil system or a gas piston, a way must be found to achieve the effects of an [unlocked] blowback action with a bolt of lighter mass. The design described in the following solves this problem. Since force is equal to mass multiplied by acceleration, one can increase the force either by increasing the mass or by increasing the



87. Figs 1 and 2 from the disclosure of Grossfuss patent no 955 392, with components of the half-locked roller system illustrated and numbered. The action depicted is discussed in the text, below. courtesy Walter Schmid

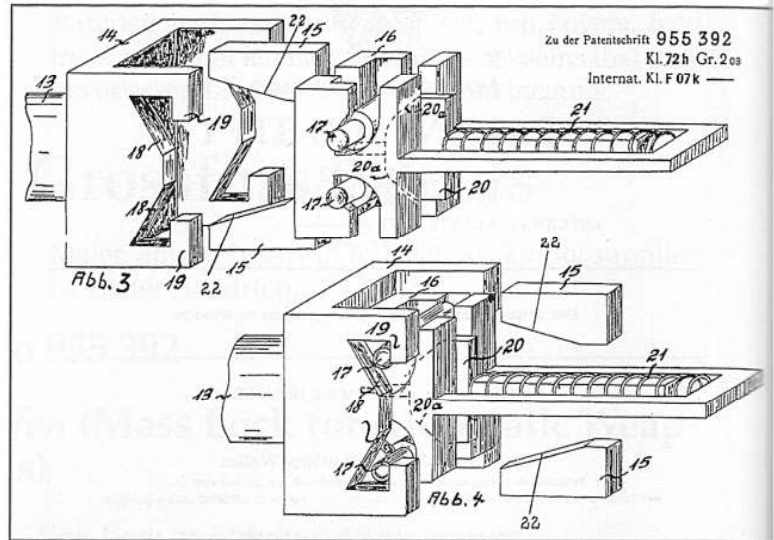
acceleration. This invention of a new locking system chooses the latter way; that is, the effectiveness of a [unlocked] blowback action with a lightweight mass is achieved by increased acceleration.

Figs 1 and 2 depict the schematic arrangement. The barrel (1) is attached rigidly to the receiver (2). The bolt assembly consists of the bolt head (3) and the bolt carrier (4). They are connected flexibly and held together by a bayonet joint (5). The bolt assembly moves along the gliding surface (6) of the receiver and is pushed forward by the recoil spring (7). The receiver (2) is provided with gliding surfaces (8) which are slanted towards the [longitudinal] axis. The bolt carrier (4) is provided at the corresponding position with opposite gliding surfaces (9) which are also slanted towards the [longitudinal] axis. Two rollers (10) are installed in such a way that they are in contact with the rear crosswise surface of the bolt head (3) and the both slanted surfaces (8 and 9) of the receiver (2). If the rollers (10) are moved from their position depicted in the figure towards the centre, the bolt carrier (4) is pushed backward away from the bolt head (3). The inward movement of the rollers can also be achieved by the bolt carrier being pushed backward so that both rollers are moved towards the central axis by the effects of the slanted surfaces of the receiver. If this process is transferred to the firing of a cartridge the pressure acting on the bolt head is applied by the cartridge head. The main mass of the bolt assembly which is concentrated in the bolt carrier is being accelerated with a gear ratio compared to the cartridge head, so that an increased counteracting force affects the cartridge

head. The firing pin (11) is activated by the bolt carrier in the usual way. The sectional view shows clearly the position of the rollers. In case of the design according to fig 1 the acceleration of the bolt carrier has an additional effect on the receiver because the gliding surfaces controlling the movement of the rollers are part of the receiver. To avoid this disadvantage the gliding surfaces are according to fig 2 part of a body which is fixed to the barrel. By this design the reaction force is prevented from propagating to the outside due to the direct connection with the original force. The designations of the parts correspond with these of fig 1. The body with the gliding surfaces which is fixed to the barrel is designated (12). The effect of a design according to this invention is to be achieved very easily with the action of the MG42, which needs only some small changes.

The schematic mode of operation of the MG42 action is shown in figs 3 and 4. Fig 3 depicts the bolt in the unlocked position and fig 4 in the locked position. In fig 3 the bolt is shown in its rearmost position. On firing the bolt is pushed forward by the pressure of a spring (not depicted) towards the barrel (13) which is connected rigidly with the locking piece (14). The curved surfaces (15) are connected rigidly with the receiver (not depicted) and if the bolt head (16) is moving to the left they cannot act on the locking bodies [rollers] (17) because these are in their most inward position. If the face of the bolt head (16) has passed the curved surfaces (15) it enters the inside of the locking piece (14). While doing so the locking bodies [rollers] (17) co-operate with the stop surfaces (18) and are forced into the locking position by a movement directed away from the bolt axis and which is depicted in fig 4. During this movement the locking bodies [rollers] (17) move behind the shoulders (19) of the locking piece (14).

By this the locking of the locking piece (14) with the bolt head (16) is achieved, and at the same time the firing pin with the bolt carrier (20) is released, which then due to the inertia of the moving mass and the effect of the firing pin spring hits the primer and ignites the cartridge. During the recoil of the barrel (13) the locking bodies [rollers] (17) act with their central part on the curved surfaces of the receiver (15) and are forced inwards during further return. By this the bolt head (16) is accelerated backwards due to the unrolling of the locking bodies [rollers] (17) along the surfaces (18) of the locking piece (14) and the surfaces (22) of the bolt head (16). The bolt carrier (20) is accelerated additionally compared to the bolt head (16) when



88. Figs 3 and 4 from the disclosure of Grossfuss patent no 955 392, with components of the recoil-operated MG42 action illustrated and numbered, and discussed in the text, below.

Showing the half-locked action (patent figs 1 and 2) as a logical offshoot of the already patented recoil-operated MG42 was a good idea, as it made the new concept more easily acceptable to the *Patentamt*.

courtesy Walter Schmid

the locking bodies [rollers] (17) are moved inward by the curved surfaces (20).

These locking components of the MG42 can be easily changed in a design that works according to the subject of this invention. If one wants to proceed according to fig 1 the curved surfaces (15) must be moved forward far enough so that the locking bodies [rollers] (17) are moved by the curved surfaces (15) toward the centre as soon as the bolt head (16) starts to move backwards. The shoulders (19) of the locking piece (14) fixed to the barrel (13) can be left out.

If one wants to proceed according to fig 2 the curved surfaces (15) of the receiver are left out and the locking surfaces of the locking piece (14) shoulders (19) are tilted by 30° for example against their original position. Then, as the gas pressure acts on the bolt head (16) the guidance bodies [rollers] (17) move due to the slanted surfaces of the shoulders (19) towards the centre and accelerate the bolt carrier (20). Thereafter the locking bodies [rollers] (17) are no longer used for locking but for accelerating the bolt carrier.

The advantages for fast-firing automatic weapons resulting from this design are the following:

- There is no barrel recoil and as a result of this the barrel return spring assembly can be omitted.

- The diameter of the barrel can be increased to allow for higher thermal load.
- The omitting of the curved surfaces and of the stops for stopping the recoil of the barrel which are subjected to a particularly high strain due to the blows mean considerable savings in working hours and high-quality materials.
- The strain of the locking piece fixed to the barrel is also reduced, because there are no more locking forces acting [on it].

### **Patent Claims**

1. Blowback action for automatic weapons which allows a backward movement of the [bolt] head at the moment of firing. It is designed in such a way that the [bolt] head (3) which is coupled with the bolt carrier (4) in a lengthwise adjustable way can apply pressure to the bolt carrier (4) by means of two rollers (10). The two rollers (10), which glide along two slanted surfaces (8) located in a stationary position opposing the barrel (1) transfer the pressure to two surfaces (9) of the bolt carrier (4), which are slanted oppositely.
2. Blowback action according to claim 1 applied to the MG42. The design is marked by the relocation of the locking components (14, 16) and curved surfaces (15) far enough forward so that the locking bodies [rollers] (17) are moved towards the centre by the curved surfaces (18) as soon as the bolt head (16) starts its rearward movement. The locking shoulders (19) of the locking piece (14) can be omitted.
3. Blowback action according to claim 2 which is marked by the sloping of the bolt carrier (14) shoulder surfaces (19) at an angle of 30° against the original position.

## **Dr Maier's Postwar Comments on Grossfuss Patent No 955 392**

In his 1995 monograph *Zum Entwicklung des selbststarrten Rollenverschlusses* Dr Maier commented suspiciously, not to say vindictively, on this initial-Grossfuss patent, as follows:

*... This patent letter describes two mechanisms: First the rigid lock recoil operated weapon of MG42, and then exactly the same semi rigid roller breech mechanism as developed by Mauser as of 1944. This letter of patent is extremely vague and amateurish and in my opinion is a desperate attempt to show the semi-rigid roller breech*

*mechanism to be an obvious indirect result of the MG42 system. The reasoning is too far-fetched.*

*Presumably this patent was not even granted in 1943, but more than likely was granted from 21 June 1957 retroactively, after Mr Grossfuss had presented falsified documents from 1943 to the patent office. However Dr Gruner, the only possible inventor at Grossfuss, was probably not willing to lend his good name to Mr Grossfuss' forgeries, thus the strange addition "The inventor has requested to remain anonymous" . . . In my opinion this entire patent application was a complete fraud!"*

## **Supplement to Patent No 955 392**

*Federal Republic of Germany*

*Day of registration: June 29, 1944  
Announced on October 25, 1956*

*German Patent Office*

**Patent Application**

*Category 72h Group 2 03*

*International Category F 07k*

*G 11357 XI/72h*

*The inventor has requested not to be named*

**Paul Kurt Johannes Grossfuss, Hennef/Sieg**

**Two-Piece Bolt**

**Supplement to Patent Application G 11355 XI/72h**

BUNDESREPUBLIK DEUTSCHLAND

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Tag der Anmeldung: 29. Juni 1944  
Bekanntgemacht am 25. Oktober 1956

*Schulz*

**PATENTANMELDUNG**

KLASSE 72h GRUPPE 203  
INTERNAT. KLASSE F 07k ———  
G 11357 XI/72h

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Der Erfinder hat beantragt, nicht genannt zu werden

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Paul Kurt Johannes Grossfuss, Hennef/Sieg

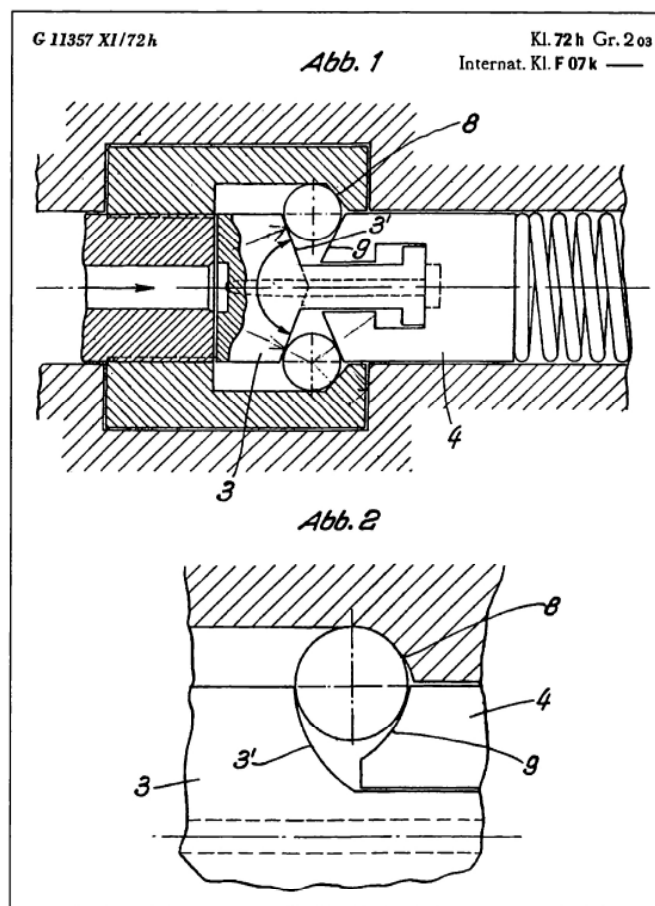
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Zweitelliger Verschluss  
Zusatz zur Patentanmeldung G 11355 XI/72h

89. The title page of the supplement to patent no 955 392, translated on the previous page. Again the inventor, Dr Gruner, "has requested not to be named".

courtesy Walter Schmid

In the main application G 11355 XI/72h a two-piece bolt for automatic weapons became known which is marked by the start of the rearward movement of the [bolt] head at the moment of firing. The specific feature of this bolt is that its head is provided with rollers at two horizontal shoulders at the front end, which are pressed against two roof-like slanted surfaces. The parts of the rollers pointed to the outside are in contact with the slanted surface of the locking piece, while the parts pointing to the inside are in contact with the slanted surfaces of the bolt carrier. The angles of the slanted surfaces are developed in such a way that during the unroll of the rollers the bolt carrier covers a distance several times longer than that of the bolt head during the rearward movement. Based on this, the new invention solves the task of affecting much more the movement of the bolt carrier in comparison to the bolt head. The ratio of movement between bolt carrier and bolt head is now dependent on three instead of two angles, and also it is increased by several times compared to the results which are to be achieved with the design described in the main invention. For this purpose the shoulders along which the rollers move must be at a certain position, i.e. the gliding surfaces of the bolt head (3) must be slanted in an opposite way compared to the gliding surfaces of the bolt carrier (4). A further prerequisite is that the outside slant and the shoulder slant form an acute angle. Additionally, the line perpendicular to the shoul-



90. Figs 1 and 2 from the supplement to Grossfuss patent no 955 392, titled "Two-piece bolt". The components are illustrated and numbered, and discussed in the text below. courtesy Walter Schmid

der [of the bolt head], which starts from the centre of the rollers when in outer position, must end at the head of the chambered cartridge to allow for a positive frictional connection. By the slant of the shoulder (gliding surfaces) another advantage is achieved: the rollers move much faster into the outer locked position when the bolt is moving forward after pressing the trigger for firing. By this the force acting on the firing pin for igniting the cartridge is also higher. Instead of slanting shoulders the surfaces may also be curved, depending on the desired ratio of movement between bolt head (3) and bolt carrier (4).

The invention is depicted in two design examples: Fig 1 depicts the two-piece bolt with rectilinear shoulders. Fig 2 depicts the version with curved shoulders.

The surfaces of the bolt head (3) are indicated as (3') and the surfaces of the bolt carrier (4) are indicated as (9). The surfaces 3' constitute the outside slant which shall form an acute angle with

the shoulder slant (8). The other components correspond to that of the main patent application.

### **Patent Claims**

1. Two-piece bolt that allows a backwards movement of the [bolt] head at the moment of firing according to patent application G 11355 XI/72h.

*It is designed in such a way that the shoulders (gliding surfaces) of the bolt head (3) form an obtuse angle (fig 1).*

2. Two-piece bolt according to claim 1 which is designed in such a way that the gliding surfaces (3') have concave or convex shaped surfaces.

## **Patent No 955 390**

*Granted on account of the First Transition Law as of July 8, 1949*

*(WiGBL. S. 175) = [Economic Law Gazette page 175]*

*Issued on January 3, 1957*

*German Patent Office*

### **Patent Document**

*No 955 390*

*Category 72a Group 2 05*

*International Category F 07b; G 11365 XI/72a*

*The inventor has requested not to be named*

*Paul Kurt Johannes Grossfuss, Hennef/Sieg*

**Patronenlager für Selbsttätige Waffen (Cartridge Chamber for Automatic Weapons)**

*Patented in the Territory of the Federal Republic of Germany from October 3, 1943 on*

*The period from May 8, 1945 until May 7, 1950 inclusively is not taken into account for the duration of the patent*

*(Ges. V. 15.7.1951) [according to the Law as of July 15, 1951]*

*Patent application announced on June 21, 1956*

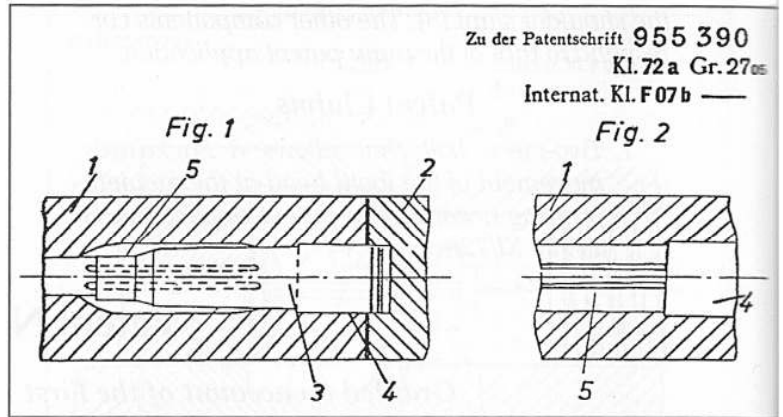
*Patent granting announced on December 13, 1956*

*The new invention is in the field of cartridge chambers for automatic weapons. It is known that in case of the use of ammunition with a conical cartridge case at least one part of the cartridge chamber is formed cylindrical to achieve a sufficient sealing during the glide out. Since by the way of production a change in form of the cartridge case cannot be achieved, the cartridge case is brought in a cylindrical form at the moment of firing. The gas pressure occurring inside the cartridge case is doing the reshaping. From the mechanical point of view the gas pressure acts as a form punch and the chamber as the die plate. The wall of the cartridge case clings to the cylindrical wall of the cartridge chamber and can in this way take on the sealing during the glide out of the case. These cartridge chambers have the disadvantage that during the backward movement of the case a high amount of friction occurs between cartridge cham-*

*ber and case because the gas pressure presses the case firmly against the walls of the chamber.*

*The invention goes on from this point and includes longitudinal grooves for an easier gliding of the cartridge case in the cartridge chamber which start in front of the front rim of the cartridge chamber and reach backwards for a certain length. After the bullet has left the cartridge case the gas pressure is led through these grooves from inside the cartridge case to the outer wall of the case so that the contact pressure between cartridge case and cartridge chamber is reduced and thus also the friction.*

*If a cylindrical sealing is intended with such type of cartridge chambers it is practical to let the grooves end a bit in front of the beginning of the cylindrical zone so that the outer gas pressure cannot reach the sealing cylinder until the gliding starts. In case of actions where the start of the backward movement of the cartridge case follows*



92. Figs 1 and 2 from the disclosure of Grossfuss patent no 955 390.

Notwithstanding Dr Maier's comments, below, that "This is a patent application for the grooved cartridge chamber", the patent actually describes a method of sealing a fluted cartridge chamber by means of a cylindrical area shown as 4 in the above illustrations, and described in the text, below. courtesy Walter Schmid

91. The title page of patent document no 955 390 titled "Cartridge Chamber for Automatic Weapons", translated on the previous page. Dr Gruner has once again "requested not to be named".

A copy of this patent was registered in the US Patent Office Library on May 7, 1957. courtesy Walter Schmid

*shortly after ignition, this measure is unnecessary. In this case the gas grooves can reach to the cylindrical part. Because of that a faster clinging of the cartridge wall to the chamber is achieved since the air contained in the space in between can escape forward and thus cannot form an air cushion. In the drawing a suitable design of this invention is depicted. Fig 1 shows the detail of a cartridge chamber with longitudinal grooves which end in front of the cylindrical part. Fig 2 shows the detail*

*of a cartridge chamber with longitudinal grooves which reach to the cylindrical part. In fig 1 the barrel with cartridge chamber is indicated by (1) and the bolt by (2). The cartridge (3) is chambered. The rear part of the cartridge chamber shows the cylindrical part (4). The longitudinal grooves (5) start in front of the cartridge chamber's front end and do not reach the cylindrical part. Thus, the powder gases can wash around the front part of the case as soon as the bullet is separated from the case to prevent the case from being pressed too hard against the wall of the chamber. In fig 2 the longitudinal grooves (5) reach to the cylindrical part (4) of the cartridge chamber. Since during the expansion of the gas pressure the air can escape through the longitudinal grooves into the barrel, no air cushion can form in the cylindrical part when the cartridge case is deformed.*

### Patent Claims

1. Cartridge chamber for automatic weapons with one or several cylindrical zones. It is designed in such a way that longitudinal grooves (5) start in front of the front rim of the cartridge chamber and end in front of the cylindrical zone (4).
2. Cartridge chamber according to claim 1 which is designed in such a way that the

*longitudinal grooves (5) lead into the cylindrical zone.*

Publications taken into consideration:  
German Patent Documents No 585 850, 237 192, 212 862.

Enclosed 1 page with drawings.

### Dr Maier Comments:

. . This is a patent application for the grooved cartridge chamber, patented in Germany as of 3

October 1944. The application for this idea was probably made the same day, or the patent office



recognised an internal memo of Messrs Grossfuss as the invention date. However, a few months earlier, on August 28, 1944, it was already known that the semi-rigid Mauser automatic rifle was using a grooved cartridge chamber. Also, the gas relief grooves in the cartridge chamber idea had

already been known from the Russian booty weapons of the Spanish War. It seems that this Grossfuss application is an attempt to “swipe” any and all secondary patents in connection with the semi-rigid roller breech mechanism.

## The Roller Lock as Applied to the MG42

### Parallel Developments by Mauser and Grossfuss

The concept of two competitors both vying for the same prize—a contract to produce an improved MG42 by adapting the half-locked roller action to the basic machine gun design—initially seems confusing, especially since, as discussed above, Grossfuss had already secured a patent on this action principle.

Dieter Handrich introduces this fascinating story with the following explanatory note:

. . . The use of patents of other firms for a company’s own projects was not unusual during the war in Germany. Rolf Wagenfuer, a former member of the Rmfruk (Reichs Ministerium für Rüstung und Kriegsproduktion; Albert Speer’s Ministry for Armament and War Production), stated in his book<sup>3</sup> that firms were routinely urged by the Speer Ministry to exchange patents and share improved manufacturing methods, in order to allow for higher and more economical production.

As far as this project at Mauser Werke was concerned, Ludwig Vorgrimler later recalled,

. . . Because of our good results in Kummersdorf with our automatic rifles 43/45 [including the Gerät 06H, later the StG45(M)], the Heereswaffenamt approached Mauser at the end of 1943 to see whether it would be possible to build this breech mechanism into the MG42, while at the same time retaining all other operating principles. In January, 1944 I received a request from Mr Altenburger to work on such a design for the MG42.

According to the postwar CIOS report on the visit to the Mauser factory, dated October 20, 1945, when Mr Altenburger was interrogated “he stated that he had been with the firm since 1933, his present position being Chief Constructor for Light Weapons up to 15mm.” When asked if he had been working on any new machine guns for the Army, he replied, “We were trying to make an improvement on the MG42 and to reduce machining to a minimum by the use of pressings. The body casing was made of special sheet steel (T242) and the breech blocks of a plain carbon steel (STC 25.61).”

### Tracing the Mauser Simplified MG42 Project in the Monthly Reports

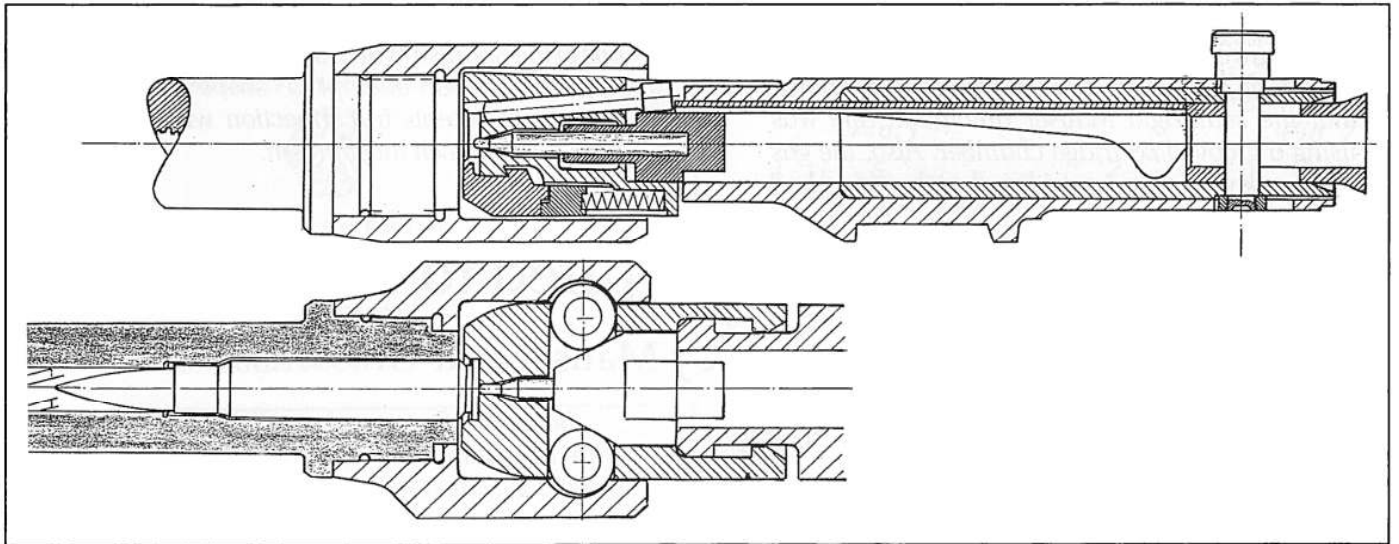
The first mention of the “Simplification of the MG42” in Mauser documentation is in *Aktennotiz Nr 3590*, covering work of the Weapon Research Establishment for the month of April, 1944, as follows:

. . . In accordance with Document Nr 3552 of the 20th of April, 1944, re the simplification of the MG42 - by the installation of the Mauser roller-lock system in the MG42 - this Firm is authorised [to carry out this work].

A brief note in the June, 1944 report, *Aktennotiz Nr 3641*, states that “The design specifications have progressed so far that parts for an experimental item can be in production by July.”

The July, 1944 report, *Aktennotiz Nr 3670*, confirms the project’s Grade I priority, and states that “The draft development has been submitted to the Army Ordnance Office, and has met with approval. A prototype is being made.”

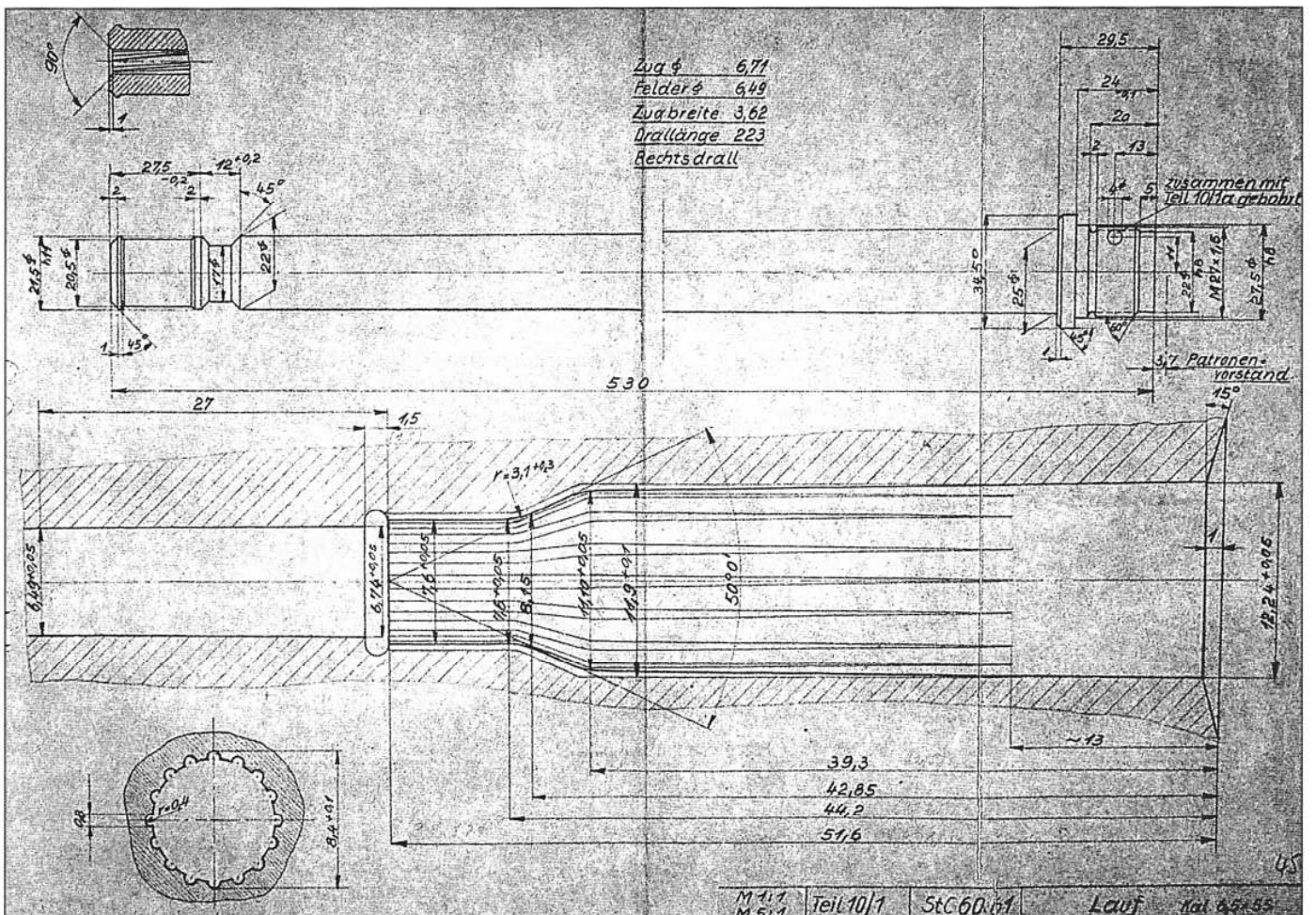
92 The Roller Lock as Applied to the MG42



93. Undated left side (above) and top closeup drawings of the Mauser *Verschluss vom deutschen MG45*, found recently in the archive at SIG in Rhine Falls, Switzerland.

The interesting story of the Mauser MG45 in Switzerland is picked up again in Chapter Twenty-eight.

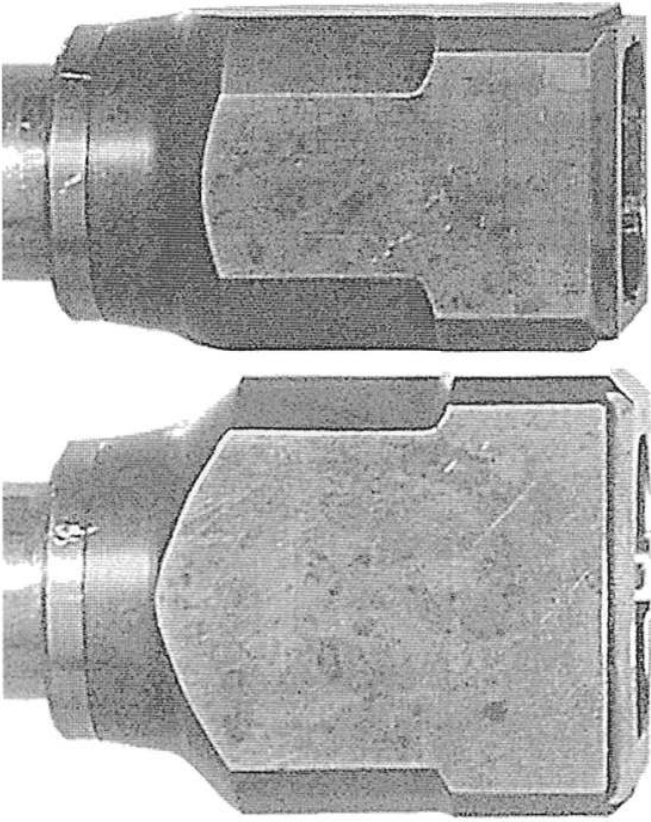
Swiss Arms AG archive, courtesy Léon Crottet



94. Dimensioned factory drawings of the barrel for the MG45, curiously labelled *Lauf Kal 6.5x55*.

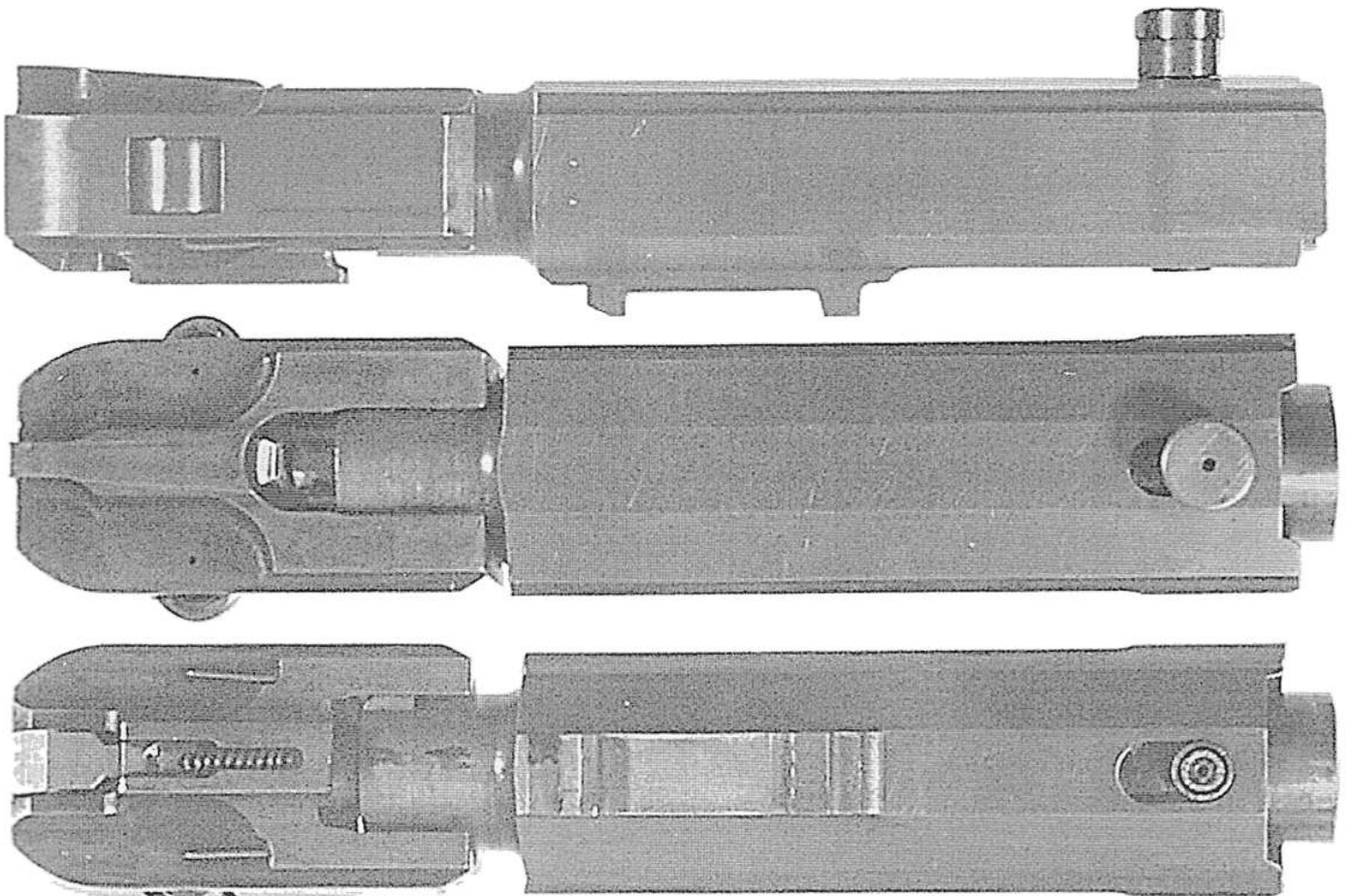
The chamber (centre and below) features 16 flutes.

Swiss Arms AG archive, courtesy Léon Crottet



95 (left). Left side and top closeups of the modified barrel extension used on the barrel of the simplified roller-locked Mauser MG45.

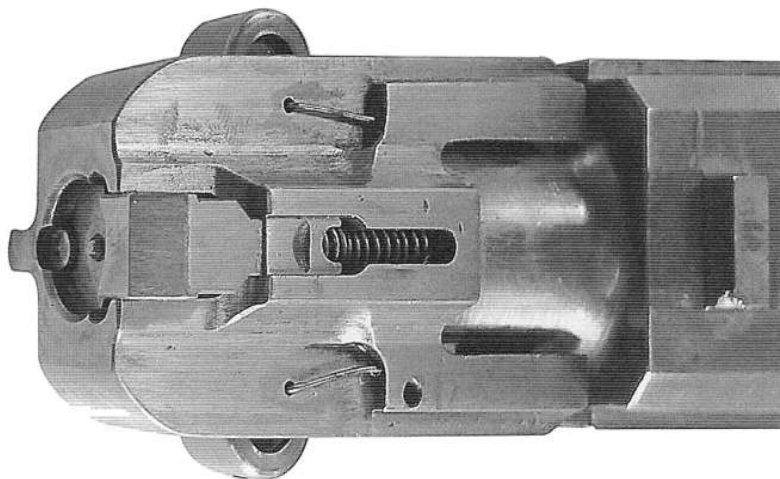
Dr Geoffrey Sturgess collection and photos



96. Left side, top, and underside views of the modified bolt used in the half-locked simplified Mauser MG42.

Dr Geoffrey Sturgess collection and photos

### Dr Gruner's Crucial "All-Night Session"



97. Front underside closeup of the bolt assembly fitted with a half-locked roller action, used in the simplified Mauser MG42. courtesy Walter Schmid

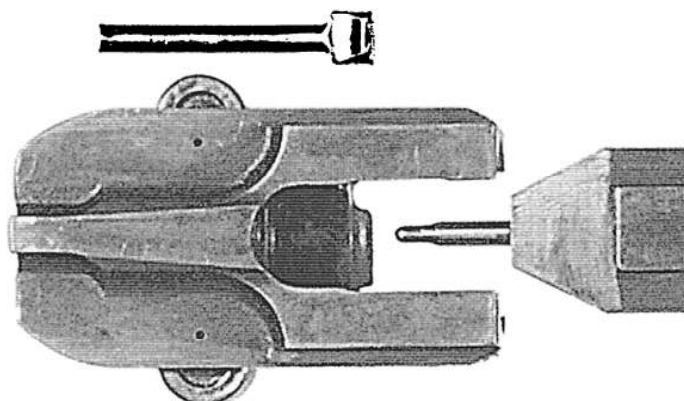
At the first meeting of the SKInfWaffen, held in Berlin on July 14 and 15, 1944, both the Mauser and Grossfuss simplifications of the MG42 were listed as "Class I Projects".

Ludwig Vorgrimler describes the events concerning the improved MG42 projects which took place at the second meeting, held at the Grossfuss plant in Döbeln on August 29 and 30, 1944, as follows:

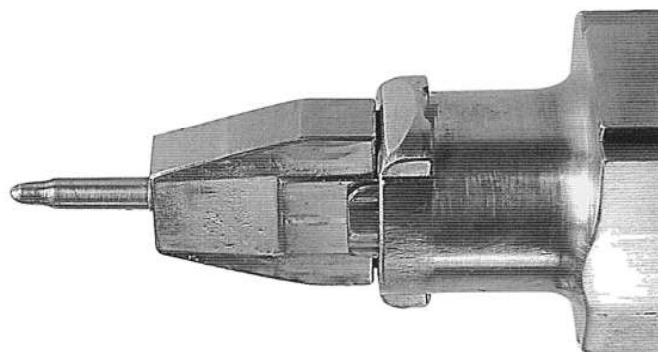
*. . . I was supposed to have my design ready for this meeting. I had a specially coloured design ready to show. Mr Altenburger represented Mauser at the meeting, and presented my design on the second day. Dr Gruner, Chief Engineer at Grossfuss at the time, was also in attendance at this meeting, and looked only briefly at the Mauser design, and then declared "We have worked through the night and have finished the design for an MG42 with a semi-rigid breech mechanism." Mr Altenburger confirmed that this design was very similiar to ours, [but] the Committee decided to give the contract to the Grossfuss company as the developing company of the MG42.*

Dr Maier confirms this, and hazards a guess as to why the Grossfuss design won out, as follows:

*. . . The Heereswaffenamt then decided that Messrs Grossfuss should receive the order to develop a semi-rigid roller breech mechanism for the MG42, even though all the pioneering work had been done by the Mauser company. The Amt was probably also of the opinion that the Mauser com-*



98. Top view of the roller-locked MG42 bolt head, with ejector (above) and *Steuerstück* removed. Dr Geoffrey Sturgess collection and photograph



99. Closeup of the roller-locked MG42 *Steuerstück*, carrying the firing pin, showing it fitted into the forward cylindrical portion of the bolt carrier.

A faint line of wear can be seen on the angled surface of the *Steuerstück* in the area where it is contacted by the roller. courtesy Walter Schmid

*pany had enough to do with the development of a semi-rigid roller breech mechanism for a carbine*

According to an earlier survey made by the SKInfWaffen of developments up to April, 1944, Grossfuss had reported at that time that they were working on an MP utilising a half-locked, two-piece bolt with a gear ratio. However it seems that for some time the firm was unable to convert the idea of a semi-rigid action into a functioning arm. They encountered problems, probably caused by sticking cartridge cases just as Mauser had experienced, and at the meeting on August 29 and 30 they introduced an MP featuring a gas-actuated retarded blowback system.

As stated in the initial Grossfuss patent document, translated above, the date of application—and



100. An historic photo, taken during the winter of 1944 - 1945—the last winter of the war—at Döbeln during a brief firing trial of the Grossfuss MG42V, shown below in figs 101 and 102.

From left: Johannes Grossfuss, HWaA Colonel Friedrich Kittel, and Dr Werner Gruner. courtesy Rolf Kallmeyer

hence the date of legal force once the patent was granted—was June 25, 1943. However it appears that the first use of the patent made by Grossfuss was at this second session of the SKInfWaffen on August 29 and 30, 1944, when a mock-up of the MG42V, fea-

turing a semi-rigid roller-locked action, was presented and demonstrated. The addition of the final touch - a fluted chamber - might be a very logical explanation for Dr Gruner's all-night session prior to unveiling his new roller-locked MG42V.

## Terminating the Mauser Version of the Roller-Locked MG42

As far as the reports of the SKInfWaffen meetings are concerned, this was the end of the Mauser version of the roller-locked MG42—at least in Germany, although interestingly, as discussed in Chapter Twenty-eight, the roller-locked Mauser MG42 enjoyed a fresh lease on life in Switzerland after the war.

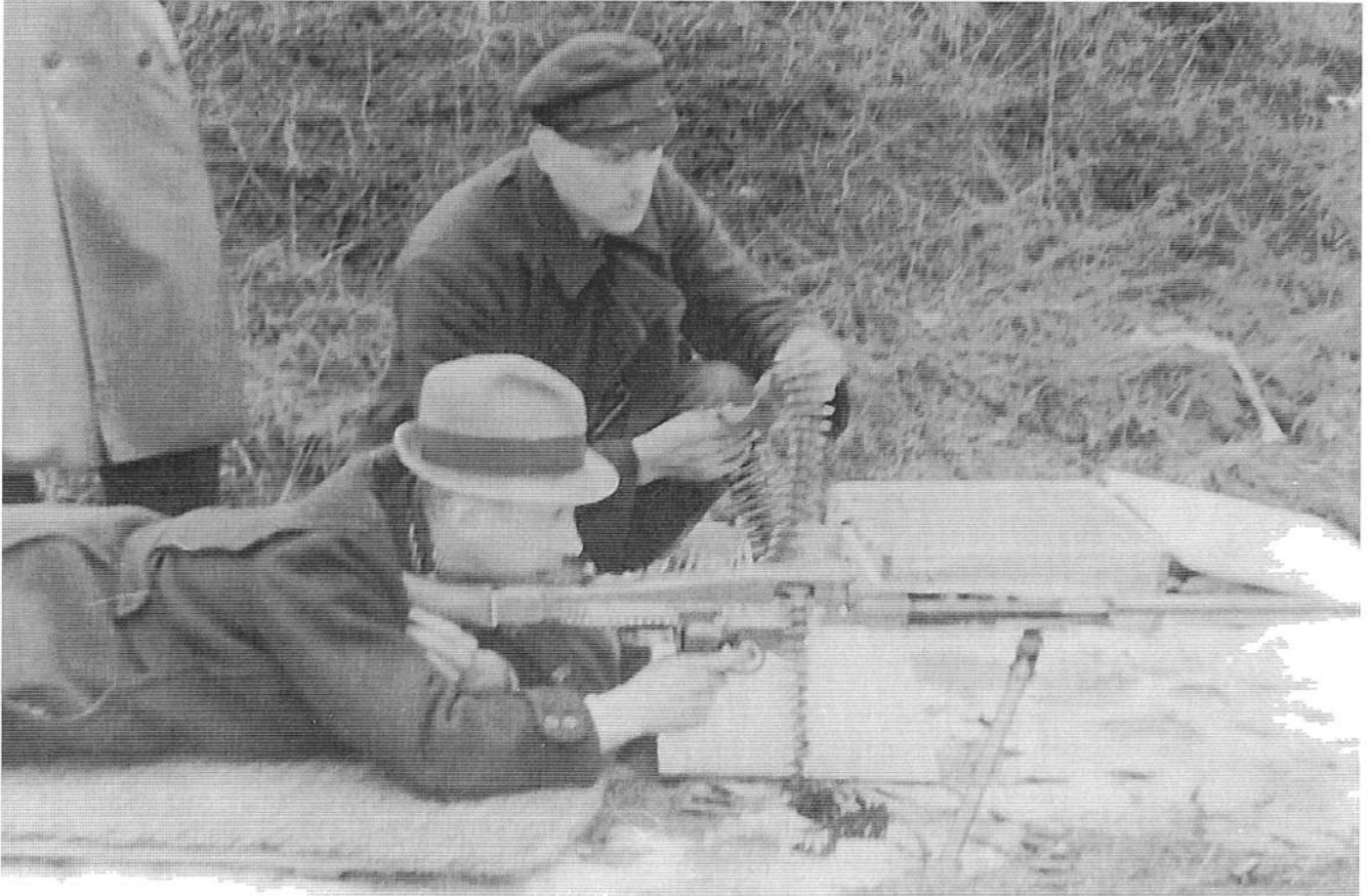
In the Mauser monthly report for August, 1944, *Stennotiz Nr 3696*, we read confirmation of the SKInfWaffen's decision to award the roller-locked MG42 contract to Grossfuss. This Mauser report mentions yet another "fully-locked" version of the MG42, and then concentrates on Mauser's development of the so-called "strait-jacket" bolt rebound catch for the standard MG42, as follows:

*... At the request of the Special Committee for Infantry Weapons this project was stopped. A replacement of the former fully-locked system, by*

*means of another fully-locked system, should no longer be taken into consideration. However the project of a new, half-locked system has newly emerged.*

*By the introduction of a "strait-jacket" - and through technical production measures - the MG42 should be turned out, with the present lock, with far-reaching functioning safeties. This "strait-jacket" has been given its present conclusive shape, by us.*

Thus only the Grossfuss MG42V design remained on the list of development projects at the third SKInfWaffen meeting, held at the Gustloff factory in Weimar on October 30 and November 1, 1944, when after being temporarily downgraded to Class III at a special meeting of the Weapons Development



101. Another historic photo showing Dr Gruner firing his roller-locked MG42V prototype assisted by a labourer named Laube. It is posited that the observer at top left is Colonel Otto Morawietz.

Note the lightened barrel jacket, which only covers the

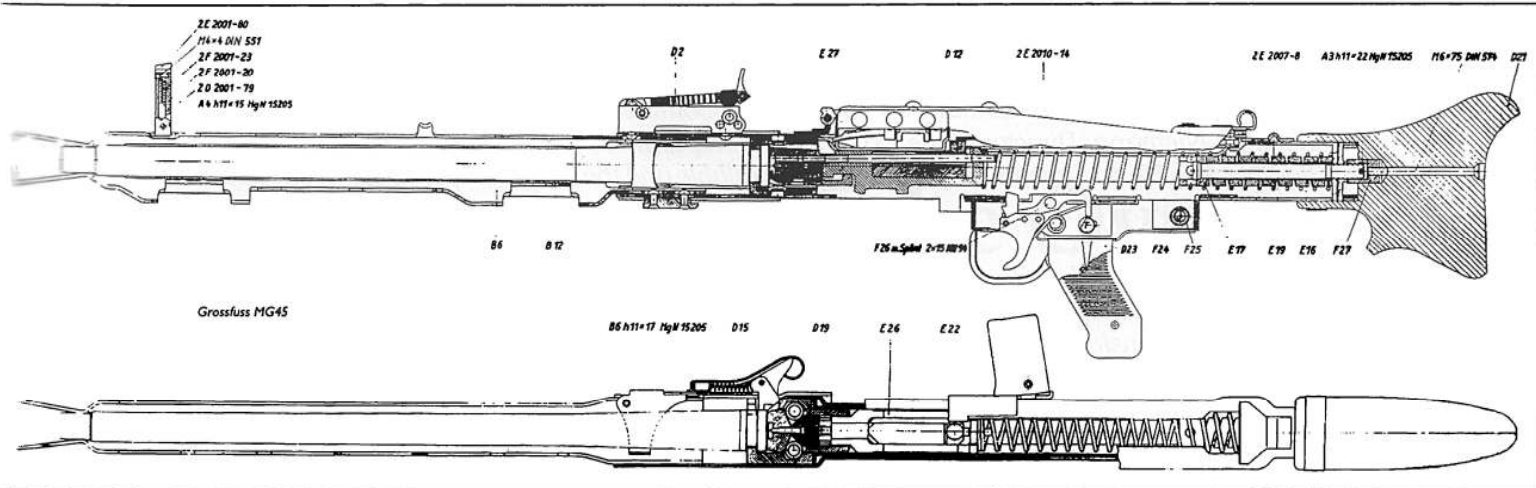
rear portion of the non-recoiling barrel.

Compare with fig 197 in the Collector Grade title MG34 - MG42: this unretouched view finally puts an end to the speculation and misinformation regarding the identity of the firer!  
courtesy Rolf Kallmeyer



Commission on September 28, the Grossfuss MG42V was once again reinstated to Class I priority.

## The Grossfuss MG42V Becomes the MG45



103. Factory assembly drawings showing left side and top views of the final iteration of the simplified Grossfuss MG42: the MG45.

According to the official description, Dr Gruner altered the MG45 so that the butt was permanently fixed and the working parts were installed and removed through the wide longitudinal slot in the top of the receiver, under the cover.

This information provides proof positive that the weapon shown in fig 102 is the original MG42V prototype, with removable butt. courtesy Dr Geoffrey Sturgess

Dieter Handrich<sup>4</sup> records that at the fourth and last recorded meeting of the SKInfWaffen, held at the Gustloff factory in Suhl on December 12 and 13, 1944,

*. . . von Lossnitzer referred to numerous testimonials, which documented considerable savings of manufacturing time and materials. WaPrüf2 noted that Grossfuss were to deliver a trial production batch of 50 prototypes to be subjected to endurance trials by the end of January, and later*

*an initial production batch was to be begun by the firm MWS (Metallwerke Spaichingen). It was stated that MWS would have capacities available to start the initial production batch, and appropriate drawings were to be handed over from Grossfuss to MWS to ensure that this project could begin immediately. In order to avoid confusion or mistakes, WaPrüf2 requested that the MG42V be renamed the "MG45". In2, as the participating responsible representatives of the AHA, agreed to this new nomenclature.*

<sup>4</sup> (previous page). Dr Gruner pauses, possibly to clear a throat, and with the cover open he removes the butt assembly from his MG42V prototype.

The half-jacketed barrel is also clearly seen in this view. courtesy Rolf Kallmeyer

## ***Dipl-Ing Rudolph Niemann(!) Describes the Grossfuss MG42V (MG45)***

Excerpts from BAOR Technical Intelligence Report No 40 dated October 20, 1945 deal with a portion of the interrogation of *Dipl-Ing Rudolph Niemann*, the erstwhile director of Weapon Research (Department

35) at Mauser-Werke, wherein Mr Niemann described the late-war development of the Grossfuss MG42V (MG45) as follows:

*. . . The following is a summary of information obtained from interrogation of Dipl-Ing Rudolph Niemann, Director of the Experimental Department of the Mauser plant at Oberndorf/Neckar. No documents or specimens are available and the information was given entirely from memory . . .*

### ***MG45***

*The MG45 is a further development of the MG42 and was designed by Dr Gruner of the Grossfuss plant at Döbeln in Saxonia.*

*The three considerations in its manufacture were as follows:*

- 1. Simplification of breech mechanism and increase in its durability.*
- 2. Simplification of manufacturing process.*
- 3. Reduction in weight in order both to lighten the soldiers' load and to save material.*

*Work on the gun was started at the end of 1943 and it was at first named the MG42V (V = vereinfacht = simplified). At the beginning of 1945 its nomenclature was changed to MG45.*

*The gun fired the normal 7.92mm ammunition, and had the type of "transmitted inertia breech block" illustrated [in fig 87].*

*Its manufacture was simplified by eliminating a lot of machining and shaping and making the gun up largely from pressed sheet metal. Barrel casing and body were in one piece and were made in two halves welded together laterally along the top and bottom of the gun. In all the weight of the gun was 25% less than that of the MG42. To informant's knowledge the weapon was never put into large scale production and less than a dozen experimental models were made. The ballistic performance equalled that of the MG42.*

## **Dr Maier Compares the Two Half-Locked Systems**

Interestingly, despite his protestations, Dr Maier had plenty of opportunity to become completely conversant with the roller-lock action as featured in the Grossfuss MG45. At a meeting of the *Waffentechnisches Kolloquium* in Berlin on February 28, 1945, he gave a lecture on the semi-rigid roller locking systems of both firms, although in a later letter to Walter

Schmid he claims that he had forgotten this event. In the lecture he referred to the Mauser version as the *Halbstarrer Walzenverschluss einfacher Art* (literally the "semi-rigid roller lock of simple method") and the Grossfuss variant as the *Halbstarrer Walzenverschluss verallgemeinert* (generalised semi-rigid roller lock).

## **Ludwig Vorgrimler Records the End of the Road for the MG45**

In his March, 1977 memoir titled *Entwicklungsgeschichte CETME-Gewehr - Deutsches-Bundeswehrgewehr G3* (Development History of the CETME Rifle/German Army G3), Ludwig Vorgrimler records the events concerning the Grossfuss MG45 during the last days of the war as follows:

*. . . The first MG45 prototype was finished at the beginning of 1945, and was successfully test fired for the first time at Kummersdorf at the beginning of May, 1945, when there was a Russian tank*

*alarm and the war was over. There is a possibility the Russians took the first prototype, along with Dr Gruner, to Russia. Mauser employees, amongst them Mr Seifried of Mauser Berlin, were taking part in the Kummersdorf MG42 test firing when the enemy marched in, and with the ensuing confusion, they understandably do not remember what actually happened to the MG45. After the war there were dealers selling drawings of the MG45, however, they were incorrect and had nothing in common with the real MG45.*



# Part II: The Roller Lock in France

## Chapter Seven

# The French Take Over

## The French Army Occupies Oberndorf

GOUVERNEMENT MILITAIRE DE LA ZONE FRANÇAISE D'OCCUPATION

DÉLÉGATION SUPÉRIEURE  
POUR LE  
GOUVERNEMENT MILITAIRE  
DU WURTEMBERG

Reutlingen, le..... 194.....

*Service*  
*du Contrôle du Désarmement*

104. The initial letterhead adopted for use by the “Superior Delegation for the Military Government of the State of Wurtemberg of the Military Government of the French Zone of Occupation”, headquartered in Reutlingen.

courtesy Jacques Barlerin

**L**eclerc’s Free French armoured force occupied the town of Oberndorf and the Mauser factory on April 20, 1945. During the following month, the entire State of Würtemmberg (“Wurtemberg” to the French) was placed under French control.

At the end of the war the German arms industry, like virtually everything else in the country, was in a

shambles, and the numerous gun designers and engineers who had occupied high positions therein were swiftly converted to the Allied cause. At Mauser, the French quickly restructured the factory management, retaining a core staff of German engineers and technicians.

### Ordering Continued Arms Production

On May 1, 1945, French Army *Chef d’Escadron* (Major) Michon was named the new managing director of the plant, and the order was given for the resumption of arms production, for the French. Post-war production consisted of P08, P38 and HSc pistols, a few MG151s and *Flammenwerfer* 41 flame throwers, plus some thousands of K98k rifles and a new Mauser Model 45 bolt-action .22 calibre training

rifle. The latter embodied most of the features of the wartime KKW military trainer in a new clip-fed design.


Other than the magazine feed, the basic difference between the wartime KKW trainer and the new Model 45 was the relocation of the tangent rear sight onto the top of the receiver, just ahead of the bolt handle.

<p>D. G. C. D. E.</p> <p>Province du Wurtemberg</p> <p>CONTRÔLE DES FABRICATIONS</p> <p>SCD/FG/</p>	<p>Reutlingen, le</p> <p style="text-align: right;">*194</p>
<p>Le Capitaine IMBAULT,</p> <p>Chef du Contrôle des Fabrications pour le Wurtemberg</p>	

105. Letterhead adopted for use by the French military authorities in matters concerning "Fabrications" under the

authority of Captain Imbault, who was in charge of all arms manufacture in the State of Wurtemberg.

courtesy Jacques Barlerin

		<b>Monat. Ausstoß</b>												4 2 1 0		
		- Versandbereit = von der Abnahme abgenommene Geräte -												Organisation		
Geschäftsjahr		Gewehre		Maschinenwaffen				Pistolen			Sonstiges					
		Karabiner		M P 44		MG 81	MG 151	Flak 38	Gerät Potzdamm	Pi 38	Pi 7,65 HSc	Fa W 41	Rückl.einrichtg.		E Z Garnituren	
		K 98 k	K 98 k Zf	Ge-häuse	Bodenstück								MG 151	Flak 38		MG 151
1944-45																
Okt. 1944	gefertigt	57 989	1 438	539	6 500	28	2 550	620	-	11 380	5 001	4 375	365	986	12 802	
	versd'ber.	55 712	1 438	539	5 200	28	2 550	620	-	11 660	4 340	4 500	-	200	12 688	
	abgesandt	63 075	1 376	539	4 539	700	2 335	620	-	12 300	5 400	3 250	366	955	12 969	
Nov.	gefertigt	64 652	1 998	9 601	15 000	-	1 500	780	5 300	14 140	5 300	458	285	599	11 738	
	versd'ber.	63 852	1 898	9 581	14 800	-	1 500	780	4 920	13 960	-	847	-	599	10 891	
	abgesandt	63 600	2 018	9 520	13 500	254	2 529	630	328	13 950	5 300	2 097	285	599	10 753	
Dez.	gefertigt	52 645	1 233	2 500	-	-	2 500	130	5 100	14 580	5 750	-	375	1 404	9 421	
	versd'ber.	-	-	2 600	-	-	2 500	130	5 100	15 000	-	-	-	439	9 171	
	abgesandt	54 512	1 233	2 641	-	-	2 056	261	9 672	13 244	4 400	-	375	965	9 171	
Jan. 1945	gefertigt	17 329	775	-	18 000	-	1 500	901	Auftrag	10 400	2 500	2 700	100	990	3 996	
	versd'ber.	18 875	775	-	14 000	-	650	901	ausge-	9 220	2 500	2 569	-	854	2 984	
	abgesandt	12 300	730	-	-	-	300	620	liefert	10 406	3 060	1 322	100	136	2 896	
Febr.	gefertigt	54 120	396	-	-	-	650	260	-	5 120	2 520	2 000	-	229	4 707	
	versd'ber.	23 267	396	-	-	-	1 800	260	-	6 430	1 920	2 000	-	229	6 438	
	abgesandt	26 900	480	-	-	-	1 500	381	-	3 300	2 500	1 880	-	-	6 770	
März	gefertigt	54 188	912	11 000	-	-	1 700	268	-	5 810	2 310	2 256	-	-	5 618	
	versd'ber.	54 288	912	11 100	3 006	-	1 700	268	-	5 920	2 310	2 200	-	-	5 426	
	abgesandt	58 400	854	9 400	18 987	-	2 376	319	-	6 870	1 544	3 530	-	-	4 847	
Mai	gefertigt	5 125								3 640	1 880					
	abgesandt	3 048							Pi 08	1 566	1 194					
Juni	gefertigt	6 650							100	5 000	1 160					
	abgesandt	6 602							-	5 442	1 475					
Juli	gefertigt	7 000	Beute-						?	2 750	1 780					
	abgesandt	8 550	Gewehr Kleka.						436	4 128	2 107					
Aug.	gefertigt	6 900	375	300					420	5 590	1 240					
	abgesandt	6 749	300	250					461	5 450	1 300	1 000				
Sept.	gefertigt	5 850	150	975					440	4 100	1 300					
	abgesandt	6 100	225	885			136		441	3 909	1 272	1 270				
Okt.	gefertigt	5 475	250	1 075					500	4 200	1 550					
	abgesandt	4 788	200	1 052			150		500	3 187	1 432	2 730				
Nov.	gefertigt	3 525	200	900					500	2 820	1 270					
	abgesandt	3 237	250	1 000					420	2 923	1 320					
Dez.	gefertigt	3 000	150	1 250					240	2 220	1 300					
	abgesandt	803	75	965					-	-	1 220					

106. Mauser production chart of rifles, machine guns, pistols and other arms for the months from October, 1944 through December, 1945, originally stamped *Geheim!* (Secret). Note the thick line between March and May, indicating zero production in April, the month in which Oberndorf was occupied by the French Army.

For the remainder of the year the factory continued to manufacture and assemble arms under French control.

The terms used in the first column of the report are translated as follows: *gefertigt*: manufactured; *versd'ber*: in inventory; *abgesandt*: shipped.

As shown, postwar production included normal K98ks, the refurbishment of *Beute-Gewehr* (captured rifles), *Kleka* (*Kleinkaliber*; Model 45 .22 calibre rifles); MG151s for AA defence; *Pistole* 08 (Lugers), P38s, HSc pistols, and *Flammenwerfer* 41 flame throwers. courtesy Jon Speed

1946		Monatl. A U S S T O S S										Abt.: 310	
		Militärwaffen					Jagd- u. Sportwaffen					Sonstiges	
		Gewehre		Pistolen			Gewehre		Pistolen			Gasdruckmesser Modell 391 / 2 u. 3	
		Karabiner K98k	Beutegewehr		Pi 08	Pi 38	Klein caliber- Büchse (KLENA)			Pi 7,65 HSc			
Jan.	Gefertigt	300	-		-	200	200			200			
	Abgesandt	2 965	75		360	3 665	508			325			
Febr.	Gefertigt	750	50		-	540	275			260			
	Abgesandt	917	50		-	518	232			124			
März	Gefertigt	3 050	225		-	3 320	1 375			1 220			
	Abgesandt	1 701	75		-	3 142	1 060			1 357			
April	Gefertigt	4 090	200		480	3 020	2 150			1 400			
	Abgesandt	49	175		480	2 930	2 200			807			
Mai	Gefertigt	-	-		-	470	1 975			-			
	Abgesandt	3 509	-		-	995	2 278			559		8	
Juni	Gefertigt	-	-		-	-				36			
	Abgesandt	2 200	-		-	-							
Juli	Gefertigt												
	Abgesandt												
Aug.	Gefertigt												
	Abgesandt												
Sept.	Gefertigt												
	Abgesandt												
Okt.	Gefertigt												
	Abgesandt												
Nov.	Gefertigt												
	Abgesandt												
Dez.	Gefertigt												
	Abgesandt												

197. Mauser production chart of military weapons, sporting and other arms for the year 1946.

Until production ceased in June, 1946, Mauser manufactured, refurbished and/or assembled 60,379 K98ks,

1,600 captured rifles, 2,690 P08s, 38,870 P38s, 10,475 Model 45 .22 calibre rifles, 15,119 .32 calibre HSc pistols, and 8 pressure test units, under French direction.

courtesy Jon Speed

A glimpse of the reorganised hierarchy at the Mauser factory is discussed in the Collector Grade title *Mauser Smallbores: Sporting, Target & Training Rifles* as follows;

The French commander, Michon, set up a new administration team to oversee activity at the Mauser plant, as at this point the Allies had not yet decided on how to deal with some of Germany's major industries.

At Mauser, a new plant directory was soon prepared, showing the reorganisation of personnel under the Büro der französische Direktion (Office of the French Directorate), led by Commandant Michon. A former German director of the firm, Dr Harnisch, was now listed as the Head of German Direction, several steps below Michon himself, his

French Generalsekretariat, and other French officials.

The Jagd- und Sportwaffen (Hunting and Sporting Rifle) Department, also led by Dr Harnisch, listed Herr Altenburger as head of the Konstruktionsbüro (Manufacturing office) . . .

By the end of June, 1946, production at the Mauser factory had been terminated in preparation for the dismantling of the factory machinery and equipment prior to the destruction of the buildings used for weapons production. Following this, training rifle components left in inventory were assembled at the French state-owned arsenal *Manufacture d'Armes de St-Etienne* (MAS), and the bolt-action training rifle became known and marked as the MAS Modèle 45.