Jan. 21, 1941. W. C. ROEMER 2,229,390

BRAKING DEVICE FOR AUTOMATIC FIREARMS

Filed Aug. 2, 1938

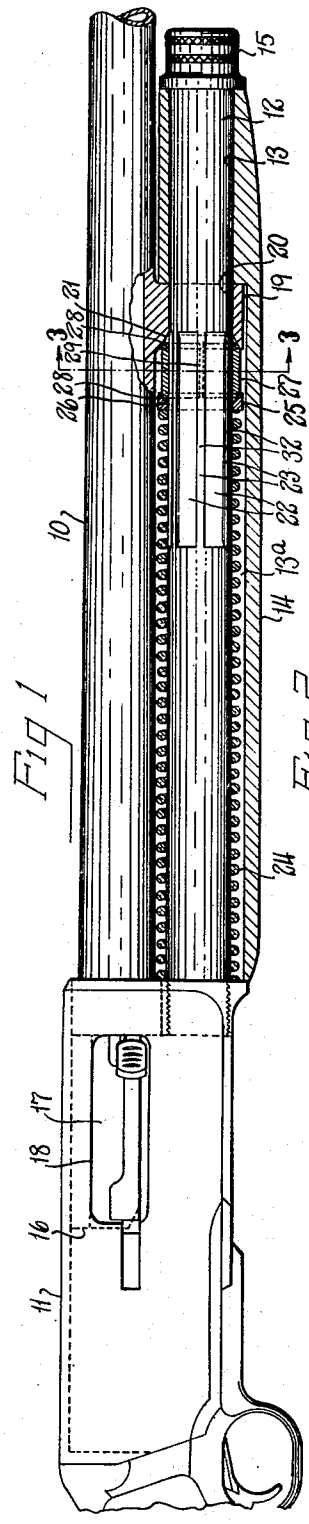


Fig 1

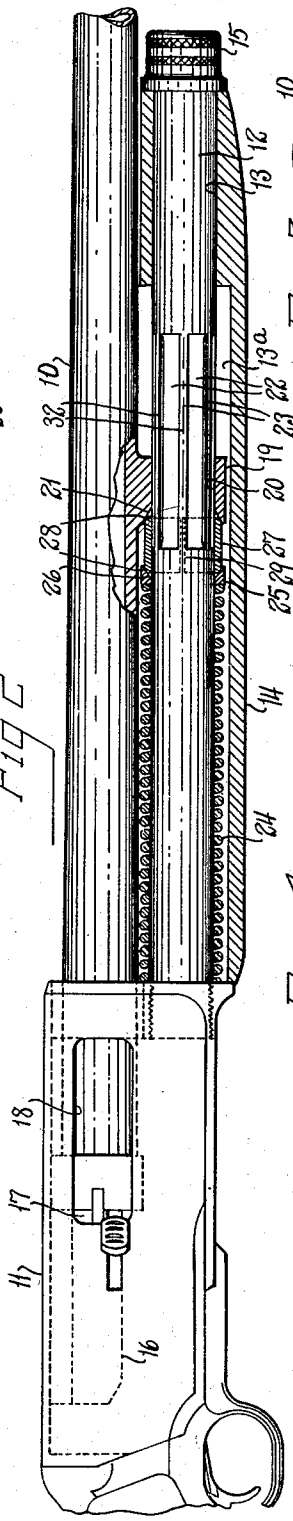


Fig 2

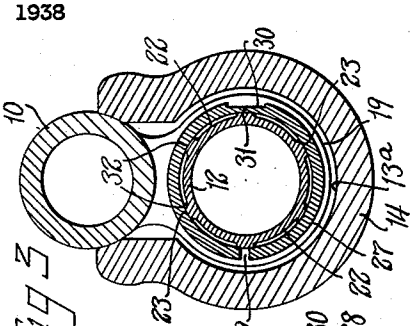


Fig 3

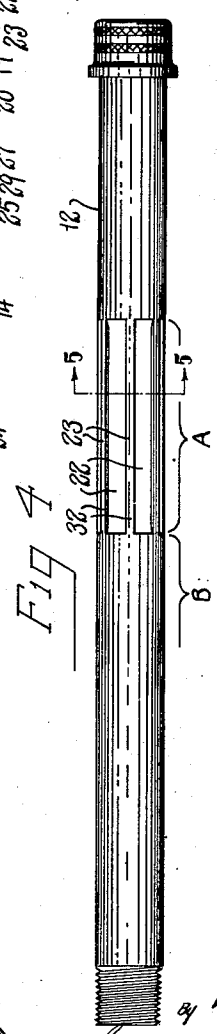


Fig 4

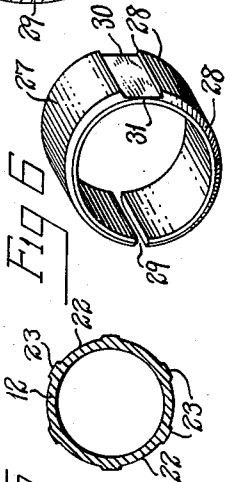


Fig 5

Fig 6

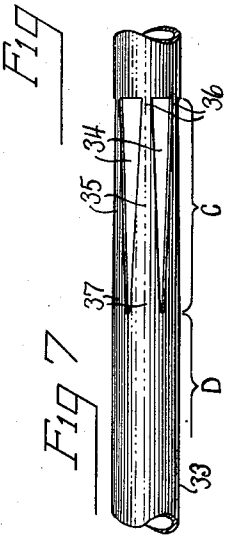


Fig 7

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Patented Jan. 21, 1941 2,229,390

UNITED STATES PATENT OFFICE

2,229,390

BRAKING DEVICE FOR AUTOMATIC FIREARMS

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Application August 2, 1938, Serial No. 222,589

5 Claims. (Cl. 42—75)

This invention relates to a braking device for automatic firearms of the recoil type, and more particularly to that type of firearm wherein the barrel-member reciprocates with respect to the receiver to effect the ejection of a fired shell, and the insertion of a fresh shell into the firing-chamber of the firearm.

One of the main objects of the present invention is to provide a superior braking device for automatic firearms of such construction and arrangement of parts as will permit the use of shells having both heavy and light loads without causing jamming or other mal-functioning of the firearm.

Another object of the present invention is to provide a superior braking device for automatic firearms of such construction and arrangement of parts as will permit the use of variable loads of shells to be discharged in the said firearm and which will have a progressive increase in braking effect from minimum to maximum during the recoil movement of the barrel-member of such firearms.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art.

In the accompanying drawing, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken view mainly in side elevation and partly in vertical central longitudinal section of an automatic shotgun embodying the present invention;

Fig. 2 is a similar view, but showing the barrel-member and associated parts in the positions they assume when the barrel-member is intermediate its forward position and its fully-recoiled position;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a side elevational view of the magazine-tube, detached;

Fig. 5 is a transverse sectional view taken on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view of the split friction ring; and

Fig. 7 is a broken side elevational view of another form of magazine-tube.

The particular firearm herein chosen for illustration in Figs. 1 to 6 inclusive is in the form of an automatic shotgun and includes a barrel 10 and a receiver 11. Extending beneath the barrel 10 and rigidly secured to the forward end of the receiver 11 is a magazine-tube 12 the forward end of which passes through an axial passage 13 formed in the forward end of a forestock 14, the said forestock being supported at its forward end by the magazine-tube 12. The forestock 14 just referred to is retained in place upon the magazine-tube 12 against forward axial displacement relative to the said tube by means of a retaining-nut or -cap 15 threadedly secured to the extreme forward end of the magazine-tube 12. The forestock 14 is also provided throughout the major portion of its length with a longitudinal clearance-passage 13a coaxially arranged with the passage 13 and through which the magazine-tube 12 forwardly extends so as to be housed therein.

The barrel 10 is formed at its rear end with a barrel-extension 16 which is adapted to reciprocate within the receiver 11 when the barrel 10 moves axially for effecting the ejection of a fired shell, the reloading of the firearm and the operation of a reciprocating breech-bolt 17 visible through an ejection-opening 18 formed in the side wall of the said receiver 11. On its under side the barrel 10 is formed with a barrel-lug 19 preferably formed integral with the said barrel and extends downwardly into the clearance-passage 13a in the forestock 14. The barrel-lug 19 just referred to is provided with a bore 20 through which the magazine-tube 12 freely extends. The said barrel-lug 19 is formed in its rear face coaxially with the bore 20 just referred to with a conical cam-surface 21 for the purpose as will hereinafter appear.

The magazine-tube 12, intermediate its forward and rear ends, is formed with an annular peripheral series of longitudinal grooves 22 (six, more or less) which result in the formation of a corresponding series of longitudinal ribs 23. The said grooves 22 and ribs 23 normally extend rearwardly of the barrel-lug 19, as is particularly well shown in Fig. 1 of the drawing.

Mounted on the magazine-tube 12 and rearwardly of the barrel-lug 19 is a barrel-return spring 24 having its rear end bearing against the forward face of the receiver 11 and having its forward end bearing against the rear face of an annular cam-ring 25. The said cam-ring 25 is mounted with freedom for longitudinal movement upon the magazine-tube 12 rearwardly of the barrel-lug 19. The barrel-return spring 24 though primarily intended for the purpose of returning the barrel 10 and associated parts to their normal forward position after the recoil of the said barrel, also serves as a yielding re-

sistance for the purpose as will hereinafter appear. The cam-ring 25 just referred to is provided in its forward face with a conical cam-surface 26 complemental to the aforesaid cam-surface 21 formed in the rear face of the barrel-lug 19.

Interposed between the barrel-lug 19 and the cam-ring 25 is a resilient split friction-ring 27 of bronze or other wear-resistant material and having its outer annular edges beveled as at 28—28 as is particularly well shown in Figs. 1, 2 and 6. The friction-ring 27 is provided oppositely from its slot 29 with a longitudinal groove 30 which thins the wall of the friction-ring 27 to a degree sufficient to form what might be termed a "hinge-portion" 31, for the purpose as will hereinafter appear.

As will be readily seen from the drawing, the friction-ring 27 is adapted to be compressed upon the outer periphery of the tubular magazine 12, by the cam-surfaces 21 and 26 respectively formed on the barrel-lug 19 and the cam-ring 25. As shown in Fig. 1, the friction-ring 27 is in a position near the forward end of the ribs 23 with the bevel 28 at its forward end in constant engagement with the cam-surface 21 at the rear face of the barrel-lug 19. At its rear end the friction-ring 27 has its bevel 28 in constant engagement with the cam-surface 26 at the forward face of the cam-ring 25. The cam-ring 25 is held in engagement with the friction-ring 27 by the return-spring 24 which also constantly urges the cam-ring 25 and friction-ring 27 forwardly into engagement with the barrel-lug 19.

In the relationship of the parts just above described, and as particularly well shown in Fig. 1 of the drawing, the friction-ring 27 is located near the forward end of what might be termed a "minimum braking zone" indicated as at A in Fig. 4 of the drawing in which zone the ribs 23 are located and in which the approximate minimum retardation required for the control of the recoil of the barrel 10 is provided.

The discharge of the firearm will cause the barrel 10 to recoil in a manner well understood in the art for effecting the ejection of a fired shell from the firing-chamber of the firearm, as wall as effecting the cocking of the firing mechanism of the said firearm. The following forward movement of the barrel and breech-bolt will effect the insertion of a new shell fed from the magazine-tube 12 into the firing-chamber of the barrel.

The recoil of the barrel 10 will cause the barrel-lug 19 forming part thereof to move rearwardly therewith together with the friction-ring 27 and cam-ring 25 against the tension of the barrel-return spring 24. This rearward movement of the barrel 10, barrel-lug 19, friction-ring 27 and cam-ring 25, is resisted by the barrel-return spring 24 with the result that the friction-ring 27 is axially "pinched," so to speak, between the said barrel-lug 19 and the cam-ring 25 so that the cam-surfaces 21 and 26 acting upon the bevels 28—28 will cause the friction-ring 27 to be compressed upon the ribs 23 formed on the magazine 12 for frictional engagement therewith. This compression of the friction-ring 27 is greatly facilitated by the hinge-portion 31 formed oppositely from the slot 29 in the said ring. The said hinge-portion 31 permits the friction-ring 27 to respond to the slightest change of pressure created between the barrel-lug 19 and the cam-ring 25 by the recoil of the barrel 10.

The recoil of the barrel 10 together with the barrel-lug 19, friction-ring 27, cam-ring 25, ultimately moves the parts just referred to rearwardly to a position slightly beyond that shown in Fig. 2 of the drawing. As shown in the figure just referred to, the friction-ring 27 has entered the "maximum braking zone" indicated at B in Fig. 4 of the drawing directly to the rear of the zone A, which former zone, it will be noted, consists of the entire outer peripheral surface of the magazine-tube 12. The said zone B therefore presents a greater frictional area to offer resistance to the rearward travel of the friction-ring 27 as compared to the relatively-small frictional area offered by the faces 32 of the ribs 23 in the zone of minimum braking effect marked A.

It will be understood that as the barrel recoils, the further the rearward movement of the barrel-lug 19, friction-ring 27 and cam-ring 25, the greater the resistance offered by the barrel-return spring 24 and consequently the greater the compression of the friction-ring 27 by the cam-surfaces 21 and 26 upon the periphery of the magazine 12. As the compression of the friction-ring 27 increases during the rearward travel thereof, the greater will be the frictional resistance created between the inner annular surface of the said friction-ring 27 and the ribs 23. The effect of the friction-ring 27 entering the zone B of maximum braking is that of cushioning the recoil of the barrel 10 with a resultant sharp decrease in the rearward travel thereof thus avoiding undue impacting of the barrel-extension 16 against the rear wall of the receiver 11.

Fig. 7 illustrates a modified form of magazine-tube 33 that may be employed in place of the magazine-tube 12 or its equivalent illustrated in Figs. 1 to 6 inclusive. As shown, the magazine-tube 33 is essentially the same in all characteristics as the magazine-tube 12, save that the said magazine-tube 33 is formed intermediate its forward and rear ends with a peripheral annular series of rearwardly - and - inwardly - tapering grooves or recesses 34 which result in the formation of a corresponding series of rearwardly-and-outwardly-tapering ribs 35. The tapered ribs 35 form a minimum braking zone C corresponding generally to the zone A on the magazine-tube 12 employed in the structure shown in Figs. 1 to 6, inclusive.

The zone C, above referred to, differs from the zone A of the structure of Figs. 1 to 6 inclusive in that the ribs 35 of the zone C offer minimum resistance to a friction-ring at their forward ends 36 to a friction-ring like the aforesaid friction-ring 27, the said ribs 35 broadening as they progress rearwardly which results in an increase of surface-area as at 37 merging into a maximum braking zone D corresponding to the zone B on the magazine-tube 12 employed in the construction previously described.

The zone C corresponds in function to the zone A for controlling the recoil of the barrel 10 in a manner similar to that described in connection with the braking device illustrated and described in Figs. 1 to 6 inclusive, save that the braking of the recoil of the said barrel is progressively increased from minimum braking to maximum braking during the course of its rearward travel.

It will be apparent that a friction-ring initially located at the forward end of the zone C at the beginning of the recoil movement will have its inner annular surface engaged with the relatively-narrow ends 36 of the ribs 35 which offer a minimum amount of friction-surface area. The friction-ring, during the period of its travel from

front to rear of the zone C will be frictionally engaged by an increasing surface area due to the outward-tapering of the ribs 35, with the result that the friction-ring and hence the barrel 10, will be retarded with progressively increasing braking-action as the recoil movement continues. The friction-ring, upon passing over the area 37 formed at the rear ends of the ribs 35 passes into the maximum braking zone D where the maximum frictional surface engages the inner annular surface of the friction-ring for cushioning the recoil of the barrel 10, thus preventing the barrel-extension formed at the rear of the said barrel from striking the rear wall of the receiver with any harmfully sharp blow which might result in damage to the working mechanism of the firearm.

From the foregoing, it will be readily seen that provision has been made for the gradual retarding of the recoil of the barrel of the firearm, and that in both forms of the invention illustrated in the drawing the minimum braking effect takes place at the beginning of the recoil stroke of the barrel. By having the minimum braking effect at the beginning of the recoil of the said barrel, the operations of breaking loose of the fired shell from the firing-chamber of the firearm, and ejecting a fired shell may be quickly initiated and these operations, and cocking of the firing mechanism may be readily accomplished. After the barrel enters the zone of maximum braking the said barrel is prevented from too sharply striking the rear wall of the receiver 11. It will thus be seen that shells having either heavy or light loads may be interchangeably employed at will without causing a failure in the operation of the firearm or undue shock thereto.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. An automatic firearm construction including in combination: a receiver; a barrel reciprocatable with respect to the said receiver; a tube extending substantially parallel with the said barrel and provided upon its exterior periphery with longitudinally-extending alternating tapered grooves and tapered ribs, the said grooves having their widest portions located forwardly with respect to the said barrel and the said ribs having their widest portions located rearwardly with respect to the said barrel; and a friction-member movable rearwardly by the said barrel from the narrower portion of the tapered ribs on the said tube to the wider rear portions of the said ribs for frictionally checking the rearward travel of the said barrel.

2. An automatic firearm construction including in combination: a receiver; a barrel reciprocable with respect to the said receiver; a cartridge-receiving magazine-tube fixedly connected to the said receiver and having its periphery provided with a forward friction-surface of relatively-small frictional area per unit of length, and a rearward friction-surface of relatively-greater frictional area per same unit of length; and a contractible friction-means contractible against and slidable along said forward and rearward friction-surfaces during reciprocatory movement of the said barrel, substantially all portions of the said friction-surfaces along any line engaged by a given portion of said contractible friction-means during sliding movement of said contractible friction-means, being at a substantially uniform distance from the longitudinal axis of said magazine-tube.

3. An automatic firearm construction including in combination: a receiver; a barrel reciprocable with respect to the said receiver; a cartridge-receiving magazine-tube fixedly connected to the said receiver and having its periphery provided with a forward friction-surface of relatively-small frictional area per unit of length and consisting of ribs, and a rearward friction-surface of relatively-greater frictional area per same unit of length; and a contractible friction-means contractible against and slidable along said forward and rearward friction-surfaces during reciprocatory movement of the said barrel, substantially all portions of the said friction-surfaces along any line engaged by a given portion of said contractible friction-means during sliding movement of said contractible friction-means, being at a substantially uniform distance from the longitudinal axis of said magazine-tube.

4. An automatic firearm construction including in combination: a receiver; a barrel reciprocable with respect to the said receiver; a cylindrical cartridge-receiving magazine-tube fixedly connected to the said receiver and having its periphery provided with a forward friction-surface of relatively-small frictional area per unit of length, and a rearward friction-surface of relatively-greater frictional area per same unit of length; and a contractible friction-means contractible against and slidable along said forward and rearward friction-surfaces during reciprocatory movement of the said barrel.

5. An automatic firearm construction including in combination: a receiver; a barrel reciprocable with respect to the said receiver; a cylindrical cartridge-receiving magazine-tube fixedly connected to the said receiver and having its periphery provided with a forward friction-surface of relatively-small frictional area per unit of length and consisting of ribs, and a rearward friction-surface of relatively-greater frictional area per same unit of length; and a contractible friction-means contractible against and slidable along said forward and rearward friction-surfaces during reciprocatory movement of the said barrel.

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