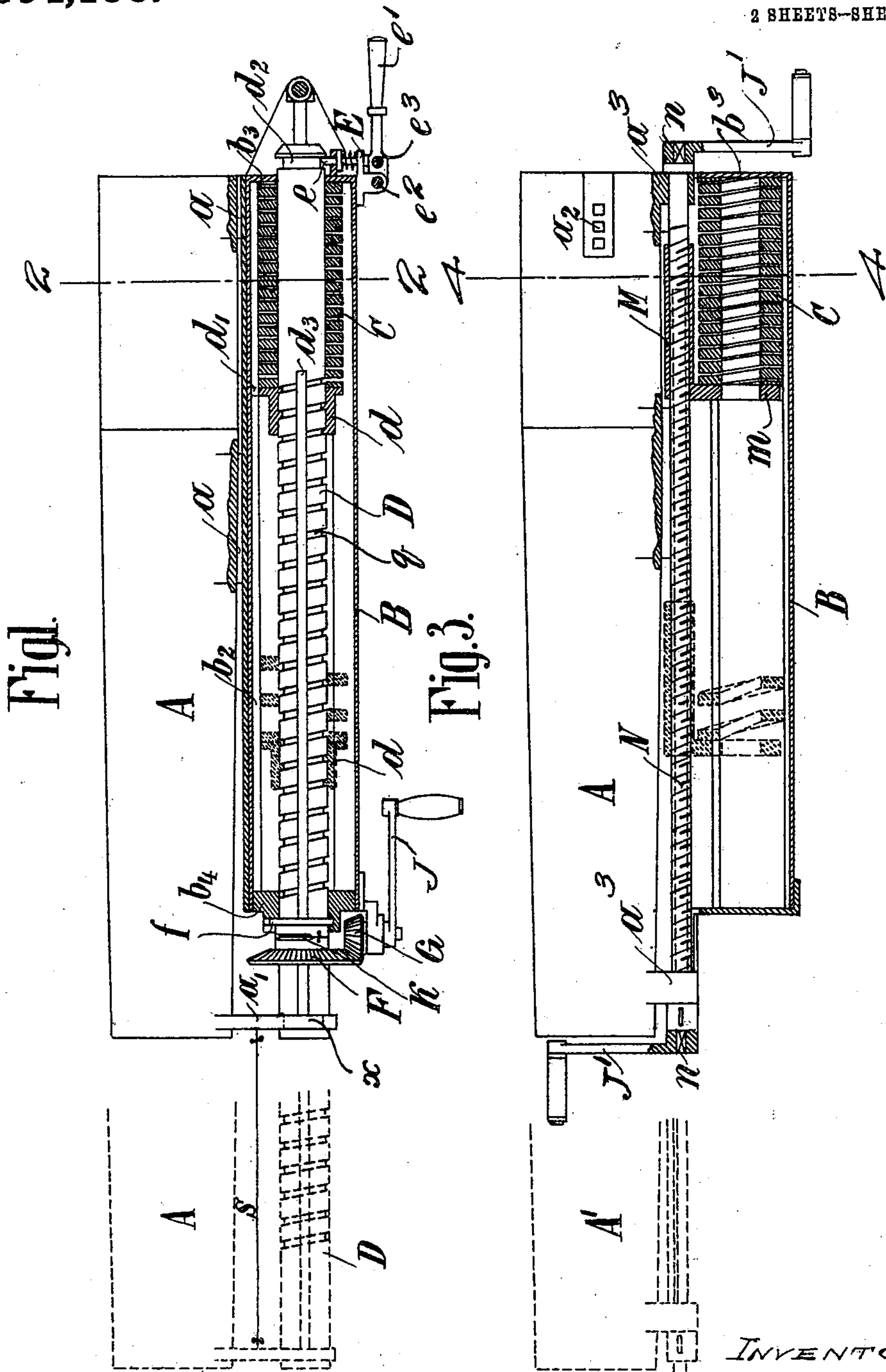


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DIFFERENTIAL RECOIL GUN.
APPLICATION FILED FEB. 27, 1909.

994,156.

Patented June 6, 1911.

2 SHEETS-SHEET 1.



WITNESSES.

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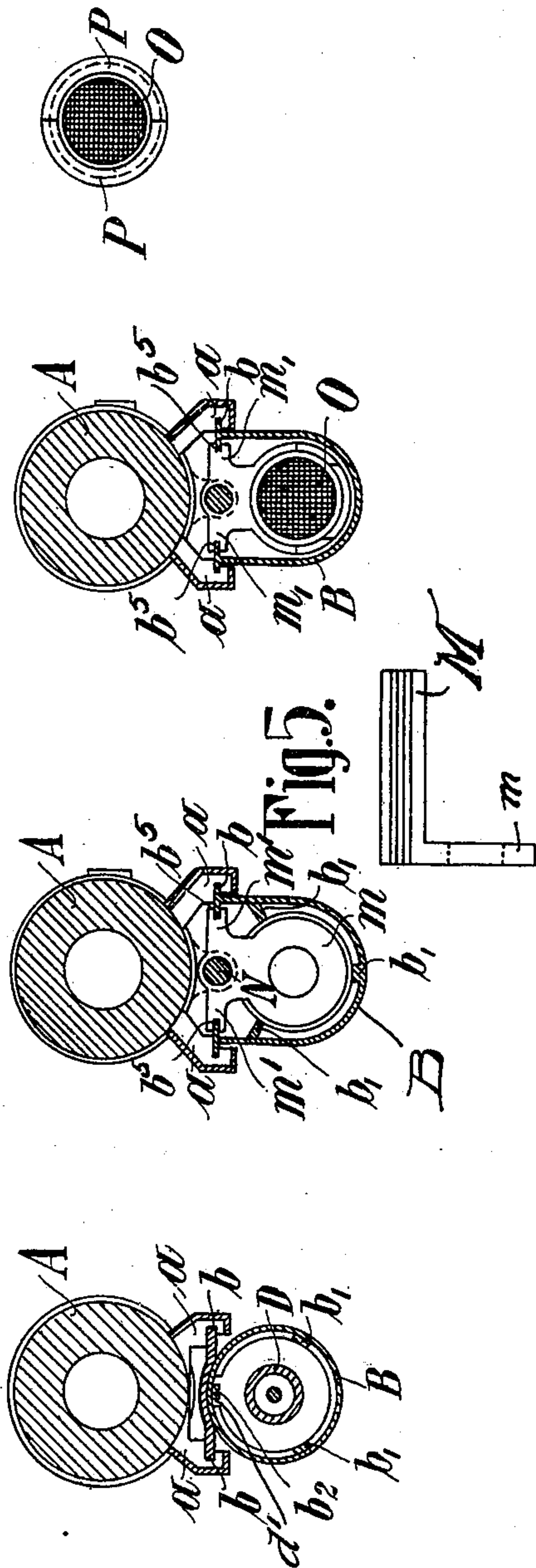
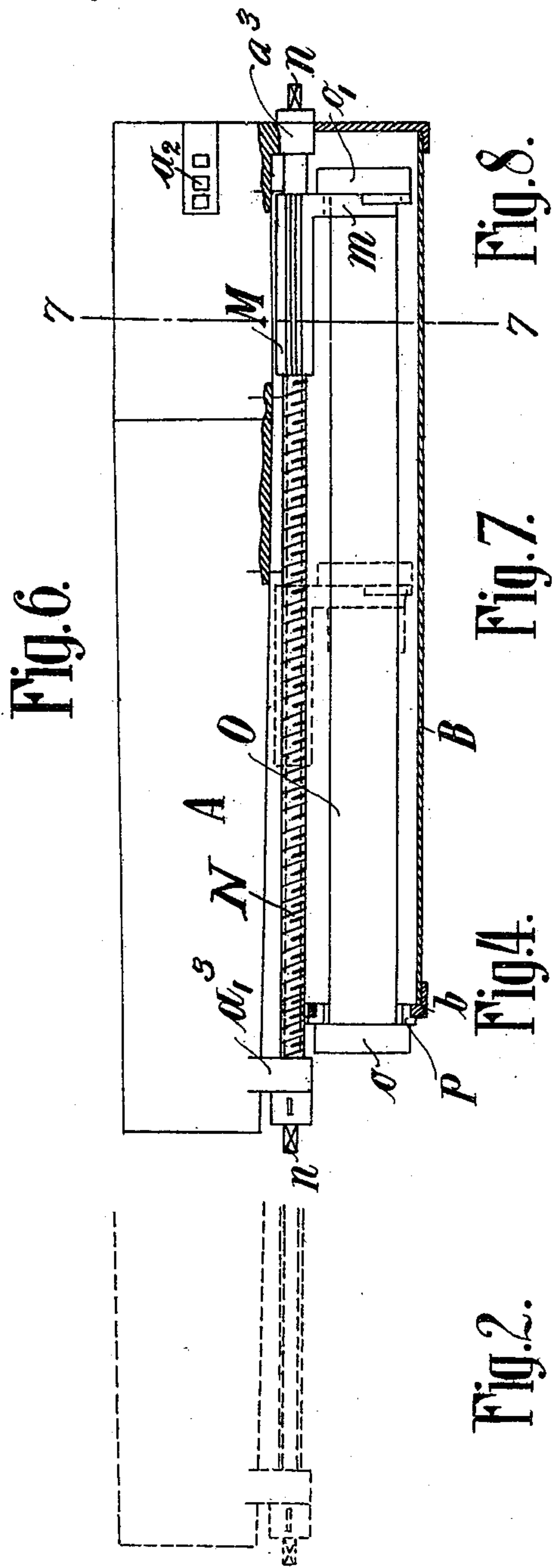
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2 SHEETS-SHEET 2.

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KONRAD HAUSSNER, OF EISENACH, GERMANY.

DIFFERENTIAL-RECOIL GUN.

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Specification of Letters Patent.

Patented June 6, 1911.

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To all whom it may concern:

Be it known that I, KONRAD HAUSSNER, of 2 Amalienstrasse, Eisenach, Germany, a subject of the German Emperor, have invented certain new and useful Improvements in or Relating to Differential-Recoil Guns, of which the following is a specification.

This invention relates to that type of ordnance provided with recoil barrels, or, more generally speaking, with recoil mechanism.

In some types of guns provided with a forwardly traveling recoil barrel in which the position of transport and battery is the same as the position of firing, the barrel is, for the purpose of shooting, either brought by hand into the position of loading and sighting, or the first shot is fired without the barrel being recoiled or brought back, and for the second shot is automatically held back in the loading and sighting position. The first method is objectionable as, for instance, in wheeled carriages, there is required just after dismounting a considerable length of time for bringing the barrel back to a recoiled position. The latter method, on account of the first shot, produces unnecessary wear on the carriage, and at the same time provides an unsteady mounting.

The present invention is intended to provide a construction of recoil mechanism for guns which obviates the difficulties referred to by providing means for changing at will the tension of the accumulator spring within certain limits without removing the barrel, and also means for releasing the accumulator when the gun is not called into action.

A further object of the invention is to provide means to give, according to the different charges of the gun, more or less initial tension upon the accumulator spring, as well as adjusting the tension of said spring to suit all conditions and requirements of use. Also, in the same connection, it is proposed to provide means whereby the tension of the accumulator spring may be adjusted in such manner that the initial speed of its forward or traveling movement increases with the raising of the barrel and decreases with the lowering thereof in order to obtain a recoil commensurate with either of these movements.

With this and other objects in view, which will be readily apparent to those skilled in the art as the details of the invention are bet-

ter understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation illustrating the invention, the view showing the gun barrel in elevation and the recoil mechanism in section, the dotted lines in said view indicating the position of the gun barrel and brake cylinder when the gun is fired. Fig. 2 is a sectional view on the line 2—2 of Fig. 1. Fig. 3 is a view similar to Fig. 1 showing a modification of the invention. Fig. 4 is a cross-sectional view on the line 4—4 of Fig. 3. Fig. 5 is a detail view of the form of nut employed in the construction shown in Figs. 3 and 4. Fig. 6 is a sectional elevation of a modification of the invention wherein the accumulator is made of rubber. Fig. 7 is a cross-sectional view on the line 7—7 of Fig. 6. Fig. 8 is a detail cross-sectional view showing the rubber accumulator and its bushing.

Like references designate corresponding parts in the several figures of the drawings.

The gun barrel is provided with side bearing flanges *a, a*, which slidably engage guide flanges *b, b*, suitably fitted to or carried by the upper portion of a carriage cylinder *B* within which operates a brake cylinder *D*, said brake cylinder having associated therewith the accumulator spring *C* operating in the manner to be presently explained. The said cylindrical member *B* is in effect a supporting and housing casing for the working parts of the recoil mechanism, and what has been termed the brake cylinder *D* is in effect the recoil spindle of the mechanism.

According to the disclosure of the invention shown in Figs. 1 and 2 of the drawings, the supporting casing *B* is closed at its opposite ends by the end caps *b³, b⁴*, respectively, the former for closing the rear end of the said casing, and the latter the front end of the casing, and both of said end caps *b³* and *b⁴* are provided with central openings therein to accommodate the rotatable and longitudinally movable recoil spindle *D*, the extreme front end of which is swiveled as at *x* in a bracket *a'* carried with and depending from the front end of the gun barrel *A*, as plainly shown in Fig. 1 of the drawings. The recoil spindle *D* is provided with ex-

5 internal threads g adapted to engage the internal threads of a traveling tension nut d . This traveling tension nut d constitutes a movable abutment for one end of the accumulator element or spring C and is held against rotary movement by a feathering connection d' with a longitudinal guide rib as b^2 arranged within the upper part of the casing B, said nut, as well as the spring C, being also guided against other longitudinal guide ribs b' arranged within the said casing B. Hence, the rotation of the recoil spindle D provides for adjusting the position of the tension nut relatively to the spring C to provide for optionally regulating the tension of said spring to suit the conditions and requirements of use. The recoil spindle D is provided at one extremity with an annular groove d^2 adapted to be releasably engaged by the holding detent e of a catch device E, which catch device is suitably supported at one end of the casing B and includes the holding detent e , which is spring held, as shown, and a release lever e' , which is pivotally supported at one end as at e^2 and is connected as at e^3 with one end of the detent e , so that by moving the said release lever e' in one direction, the recoil spindle D is released so as to permit the compressed accumulator element or spring C to come into play and project the barrel A forwardly to the position for firing and recoil.

35 To provide means for rotating the recoil spindle D and thus adjusting the position of the tension nut d , there may be employed, as shown in Fig. 1 of the drawings, a beveled gear wheel F having a feather or spline connection with the key-way d^3 in the spindle D, thus permitting the spindle D to slide through the gear wheel F while at the same time being compelled to rotate with the latter. The said gear wheel F has a swiveled or equivalent connection f with the end cap b^4 so as to be held against longitudinal movement while permitting a free rotation. Motion may be conveniently communicated to the bevel gear wheel F by means of a bevel gear pinion G carried with a suitably mounted crank J.

55 Referring to the action of the mechanism as exemplified by the construction shown in Figs. 1 and 2 of the drawings, it will be observed that the gun barrel A is held in the position of loading and sighting by the catch device E. When the catch device is released the compressed accumulator element or spring C moves the recoil spindle D, with the barrel A, in a forward direction to the position indicated by the dotted lines in Fig. 1 of the drawings, the double arrow S indicating the path of movement of the recoil spindle with the barrel. This forward traveling movement of the gun barrel and the recoil spindle is accomplished with an

accelerated motion until the position (see dotted lines in Fig. 1) is reached where the explosion of the charge is automatically effected by a suitable device, forming no part of the present application and which is accordingly not shown in the drawings. When the explosion occurs the barrel is driven back by the resulting recoil into the loading and sighting position, where it is automatically caught by the catch device E.

Referring to the tension regulating means for the accumulator element or spring C, as shown in Fig. 1 of the drawings, if the recoil spindle D is turned in the direction of the arrow K the tension nut d is moved forward toward the end cap b^4 . Thus the tension of the accumulator spring may be decreased as desired, while, on the other hand, by turning the recoil spindle in the direction opposite to that indicated by the arrow K, the spring tension is increased while the gun barrel is at rest.

A modification of the device is suggested in Figs. 3 and 4 of the drawings, wherein the recoil spindle designated by the reference letter N is journaled in suitable bearing brackets a^3 carried by the gun barrel A, and to the opposite ends of which spindle at n are detachably attached the rotating cranks J' which provide means for rotating the spindle to vary the position of the movable abutment m . This movable abutment m corresponds in function with the tension nut d previously referred to, and constitutes an abutment against which bears one end of the yielding accumulator element C, but in the modification now being referred to, the said movable abutment m includes an interiorly threaded sleeve or nut M which is engaged by the external threads of the spindle N. Also, in this form of the invention, the movable abutment or tension nut m may be provided with the forked guide arms m' which are slidably interlocked with guiding ribs b^5 suitably fitted to and carried by the casing B, as best seen in Fig. 4 of the drawings.

In the modification shown in Figs. 3 and 4 of the drawings any suitable catch device may be utilized to hold the gun barrel in its loading and sighting position, which catch device may engage openings in keeper plates a^2 fitted to the rear end of the gun barrel, as shown in Fig. 3.

Another modification of the invention is shown in Figs. 6, 7 and 8 of the drawings. This modification includes the same mechanical elements as shown in Fig. 3 of the drawings, with the exception that instead of a yielding accumulator element in the form of a spring C, as shown in Fig. 3, the further modification referred to employs a yielding accumulator element in the form of a rubber bar O. Similar mechanical elements in Figs. 3 and 6 are similarly lettered, but with reference to the mounting of the

rubber bar O, the latter has fitted thereto the terminal heads *o*, *o'*, the latter of which engages at one side of the tension nut or movable abutment *m*, while the other terminal head *o* is held against a two-part holding ring P, P, fitted in one of the end caps of the casing B.

Changes in the form, proportion and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention.

I claim,—

1. In a differential recoil gun, the combination with a stationary support, and the longitudinally movable gun barrel slidably arranged upon said support, of an accumulator element arranged to exert its tension in a direction for effecting the running-out movement of the gun barrel, means for fixing the gun barrel in a transport position coinciding with its loading and aiming position, abutments for the accumulator element,

and means for causing at least one of said abutments to be displaced in the transport position of the gun barrel.

2. In a recoil gun, the combination with a stationary support and the longitudinally movable gun barrel slidably arranged upon said support, of an externally threaded recoil spindle carried with the gun barrel and having a swiveled support from the latter stationary longitudinally arranged guides, a non-rotatable tension nut engaged and carried by the spindle and having a slidable interlocking engagement with said guides, an accumulator element arranged to exert its tension against said nut, a rotating device for said spindle, and a catch device having releasable engagement with the spindle to hold the gun barrel in the charging and sighting position.

KONRAD HAUSSNER.

Witnesses:

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HENRY HASPER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
