No. 718,719 PATENTED JAN. 20, 1903.

J. F. MEIGS & L. N. D. MIXSELL.

EXTRACTOR FOR BREECH LOADING ORDNANCE.

APPLICATION FILED AUG. 17, 1901.

NO MODEL. 4 SHEETS—SHEET 1.

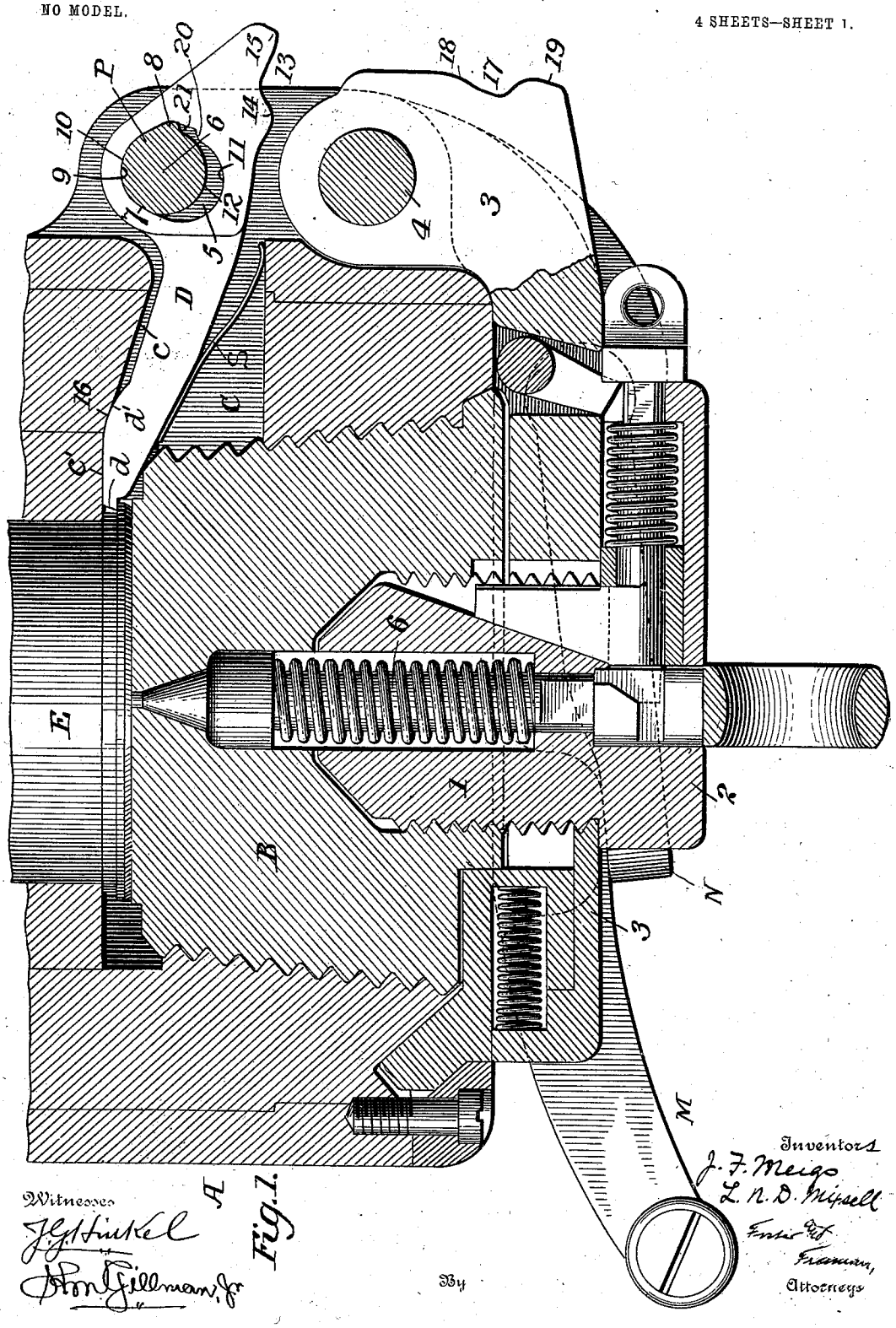


Fig. 1.

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NO MODEL. 4 SHEETS—SHEET 2.

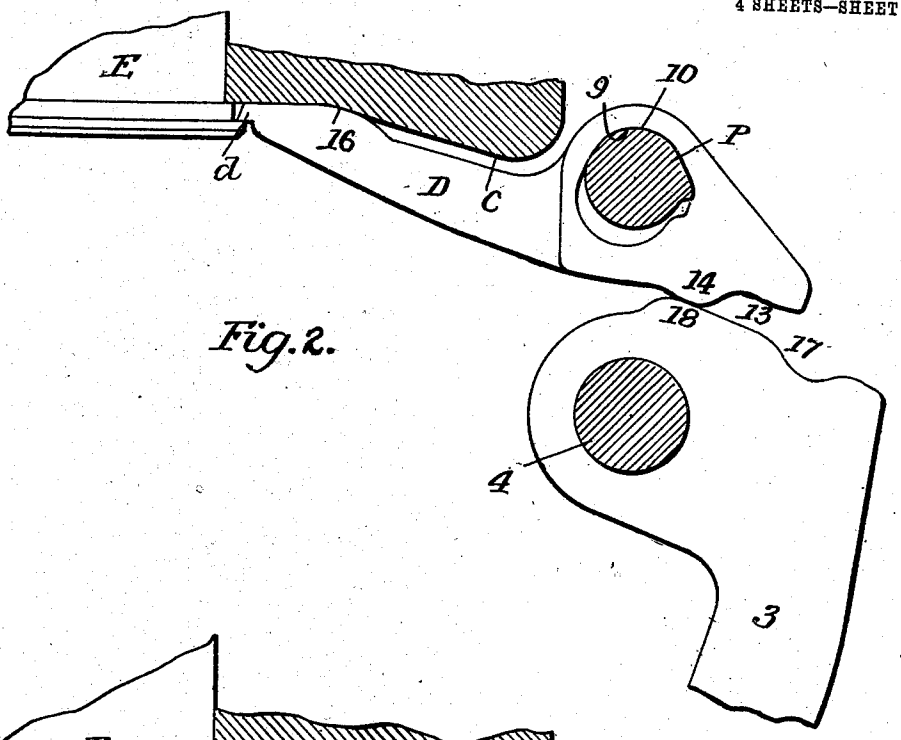


Fig. 2.

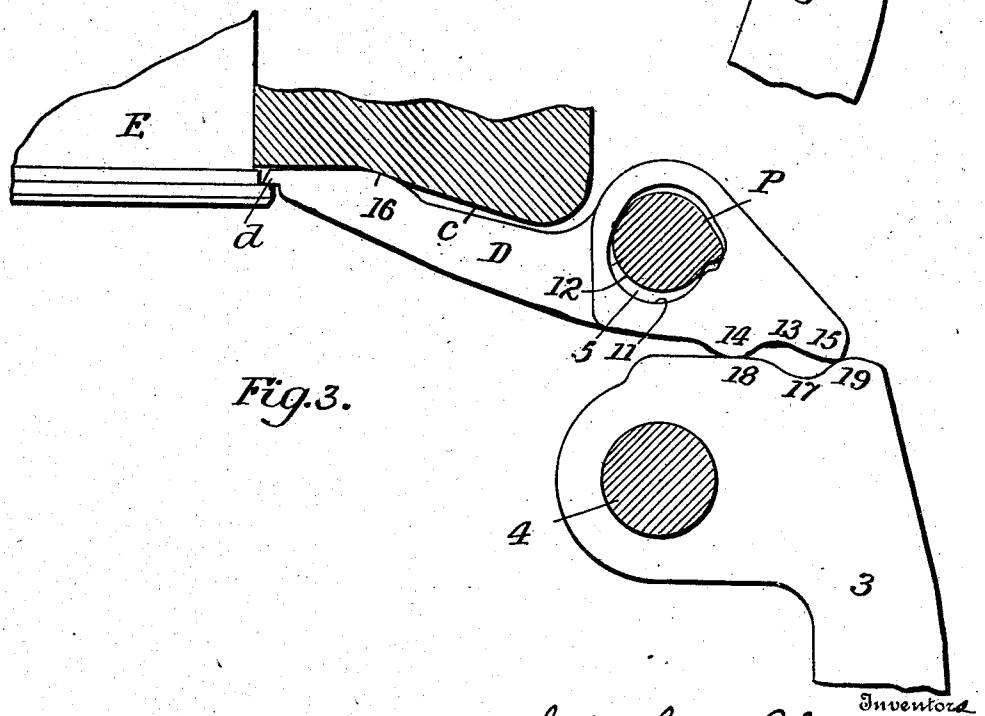


Fig. 3.

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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 4.

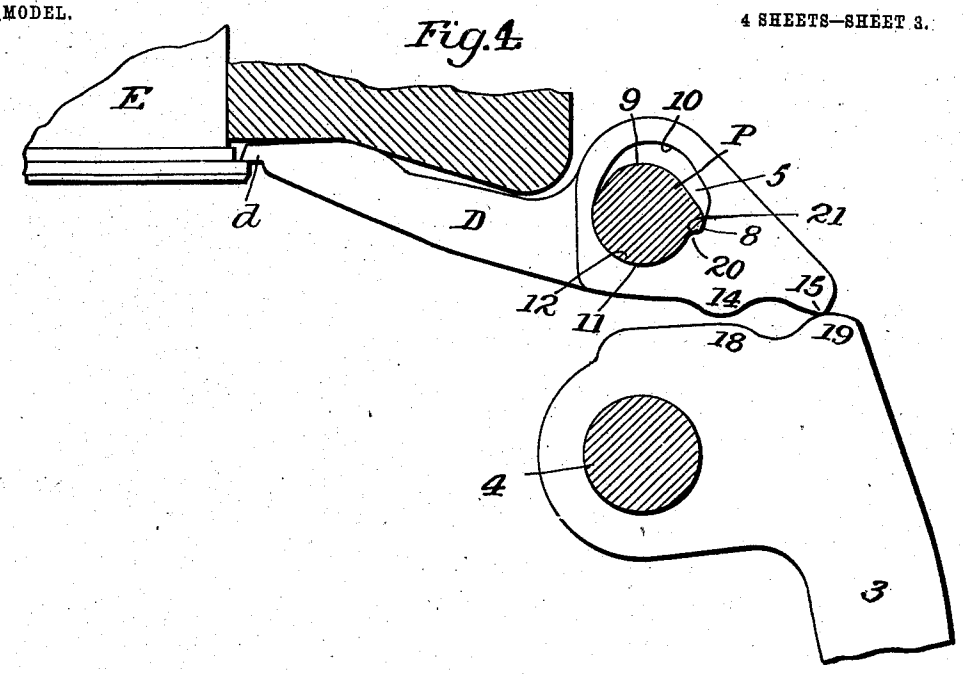


Fig. 5.

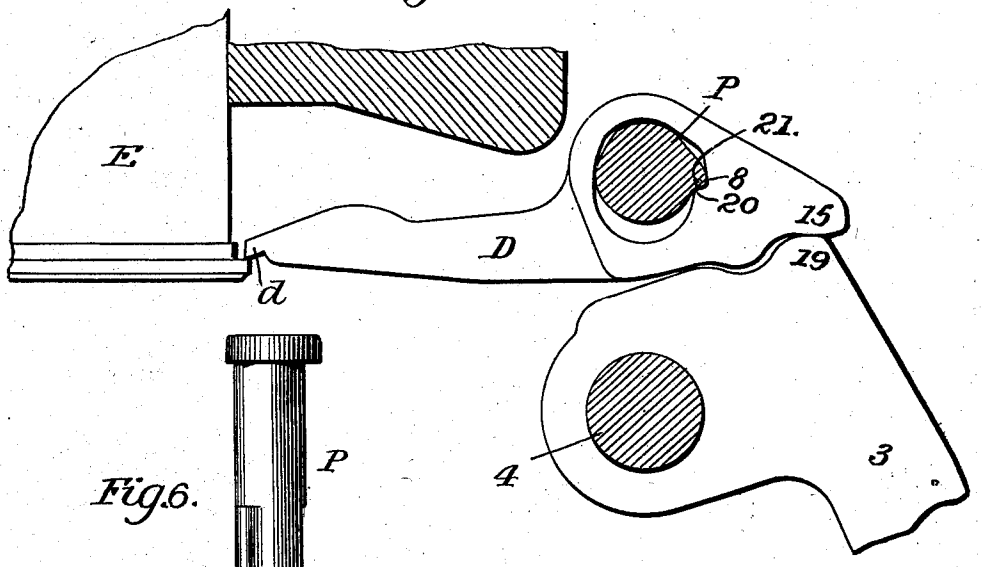
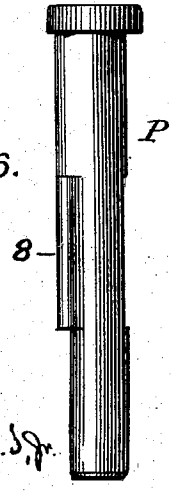


Fig. 6.



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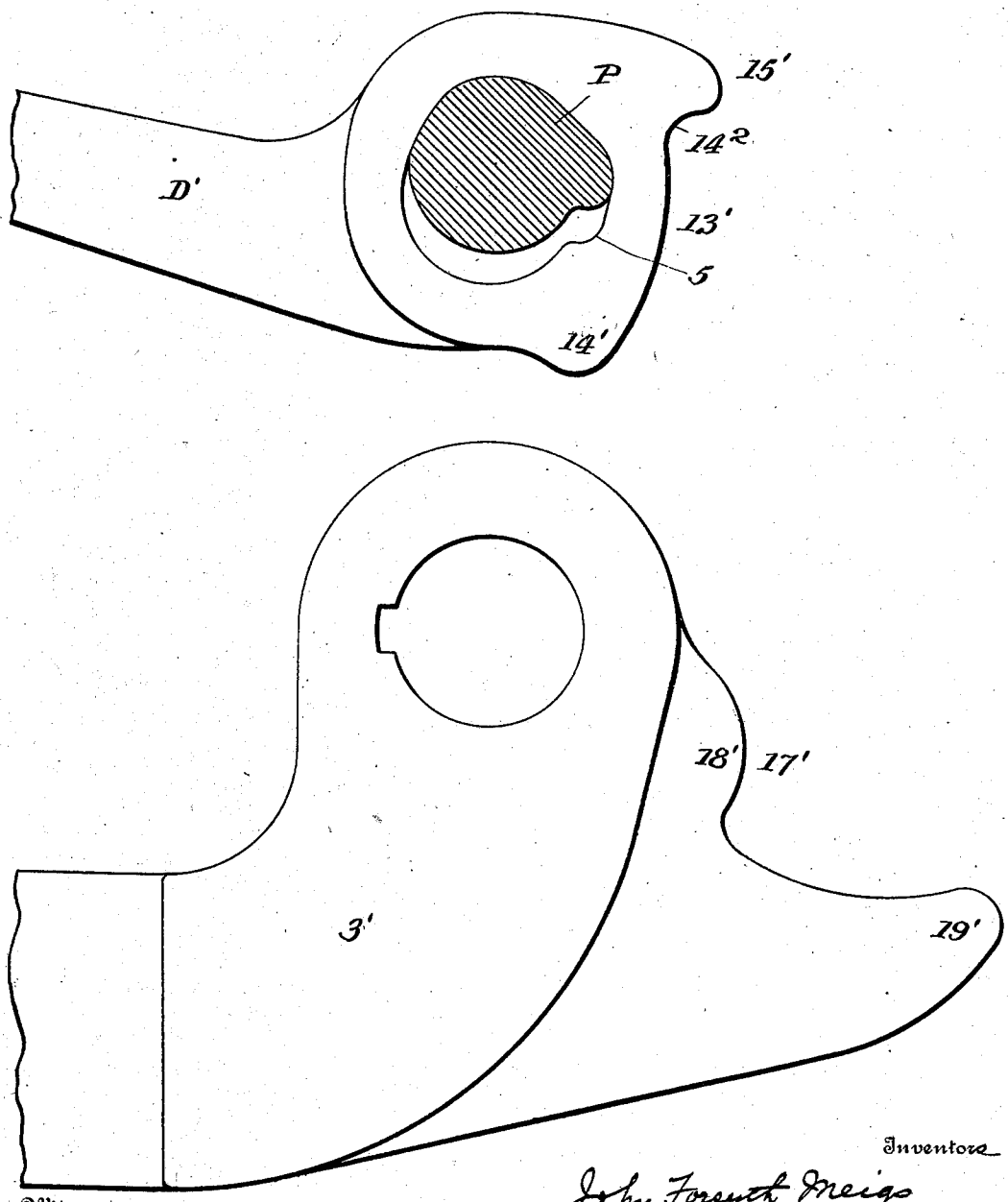
J. F. MEIGS & L. N. D. MIXSELL.

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NO MODEL. 4 SHEETS—SHEET 4.

Fig. 7.



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UNITED STATES PATENT OFFICE.

JOHN FORSYTH MEIGS, OF SOUTH BETHLEHEM, AND LEIGHTON NEALE DAVIS MIXSELL, OF BETHLEHEM, PENNSYLVANIA, ASSIGNORS TO BETHLEHEM STEEL COMPANY, OF SOUTH BETHLEHEM, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

EXTRACTOR FOR BREECH-LOADING ORDNANCE.

SPECIFICATION forming part of Letters Patent No. 718,719, dated January 20, 1903.

Application filed August 17, 1901. Serial No. 72,411. (No model.)

To all whom it may concern:

Be it known that we, JOHN FORSYTH MEIGS, a resident of South Bethlehem, and LEIGHTON NEALE DAVIS MIXSELL, a resident of Bethlehem, in the county of Northampton and State of Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Extractors for Breech-Loading Ordnance, of which the following is a specification.

Our invention relates to the breech mechanism of ordnance, but more particularly to the construction and operation of shell-extractors therefor; and our invention is more especially an improvement upon the double-fulcrum type of extractor, having one fulcrum on the gun or a part thereof and a second fulcrum on a suitable pivot-pin, although the invention as hereinafter set forth is designed for any extractor to which it is applicable.

Our invention consists, primarily, of a gun with an extractor-lever having a fulcrum on the gun and a guide piece or pin so arranged that the lever may be rocked first on its fulcrum on the gun and then about the pin, but upon a center eccentric to the center of the pin and farther from the axis of the gun than in prior constructions.

Our invention is more fully set forth hereinafter in its many details and mode of operation and is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional plan of the breech of a gun provided with our improved extractor. Figs. 2, 3, 4, and 5 are diagrammatic plan views of the extractor and its actuating means, showing the parts in the various positions they take in extracting a shell. Fig. 6 is a side view of our improved cam-shaped pivot-pin, showing the rib. Fig. 7 is an enlarged plan view showing a part of the extractor and carrier-frame with modified forms of cams thereon.

We have shown our improved extractor on a gun in connection with substantially the same breech mechanism disclosed in application, Serial No. 68,523, filed July 16, 1901, although we are not to be understood as limiting ourselves to this particular gun and breech mechanism, since our extractor may be utilized on any gun to which it may be applicable.

Having fully disclosed and claimed in the above-referred-to application the breech mechanism therein set forth, a detailed description of the parts and operation thereof will not again be given herein; but only so much of the mechanism will be described as is essential to an understanding of the operation of our improved extractor.

Referring to the drawings, A represents the breech of a gun, which receives the breech-block B, carried in this instance upon a support consisting of a threaded hub 1 and a block 2, which block is shown as lying against the outside of the breech-block carrier or carrier-frame 3. The firing-gear, comprising the firing-pin 6 and cocking mechanism, is shown of the same character as in application Serial No. 68,523, but is not herein claimed and need not be further described.

The carrier-frame 3 is suitably pivoted or hinged, as at 4, at one side of the gun-breech and means are provided for swinging the carrier-frame on its hinged pivot, while at the same time turning the breech-block on the hub 1—as, for instance, a lever M and link N—the threads on the hub and breech-block being at the proper angle to give the breech-block the desired longitudinal movement in locking and unlocking the breech. It is to be understood, however, that any desired carrier-frame and levers may be utilized, and the breech-block may be mounted in any suitable manner so as to rotate on its axis in order to be withdrawn from the breech when the carrier-frame is swung to one side.

Extending into a recess C in the walls of the breech A of the gun is shown our improved extractor-lever D, the nib *d* of which is adapted to fit under the flange of the cartridge E to withdraw the same from the bore of the gun when the extractor-lever is rocked. We have shown an extractor of the double-fulcrum type, with an improved pivot piece or pin P operating to control the movement

of the extractor-lever D through the coöperation of a cam-shaped slot 5 therein. It will be evident, however, that our improved extractor may operate, if necessary, with but one fulcrum only, and that on the pivot-piece P.

In Fig. 1 of the drawings the breech mechanism of the gun is shown closing the gun-breech, with a cartridge E in the bore, and the extractor-lever D is in a position ready to be rocked to extract the cartridge-shell when the breech mechanism is opened. In this instance the recess C is shown as having an inclined surface *c*, inclined to the axis of the bore of the gun, the inclined part of the recess, however, not extending quite to the bore, but terminating in a part *c'* substantially perpendicular to the axis of the bore of the gun. Different inclinations may be given to this surface *c* of the front wall of recess and different forms may be given to the front wall as a whole, we having merely described the surfaces *c c'* as suitable to the operation of our device. The extractor-lever D is shown formed with a rounded portion *d'*, adapted to roll on the inclined surface *c* of the recess when the lever is rocked.

The pivot piece or pin P is shown cam-shaped in cross-section, it being in cross-section substantially a circle with a center at the point 6, the surface of the pin being flattened in one place, as at 7, and shown with a projection formed by a suitable rib 8 on the side of the pin away from the gun. This cam-shaped pivot piece or pin P is suitably supported on the gun or a part thereof close to the side of the breech, and the slot 5 in the extractor D is also cam-shaped in outline, but of such dimensions that the pin P, extending into the slot, loosely engages the same. The cam-shaped slot is of such outline that, as shown in Figs. 1 and 2, the surface 10 thereof is adapted to seat upon the surface 9 of the pin, while, as shown in Fig. 4, the surface 11 of the slot is of such outline that it is adapted to seat upon the surface 12 of the pin.

The extractor-lever D is preferably provided with a properly-formed outer cam-surface 13, having horns 14 15 and suitable means are provided for bringing pressure to bear upon the cam-shaped part of the extractor-lever to rock the lever first on its fulcrum on the gun at point 16 and then on a fulcrum on the pivot-pin P, as will hereinafter be described. As shown in this instance, the carrier-frame 3 is provided with a cam-surface 17, formed with suitable horns 18 19, which cam 17 is adapted to engage the cam-surface 13 on the extractor-lever when the carrier-frame is swung to one side on its hinge-pivot; but we are not to be understood to be limiting ourselves to the particular forms of the cam-surfaces 13 and 17 on the extractor-lever and carrier-frame, respectively, nor to their relative positions thereon, and any suitable means may be provided connected with the breech-operating mechanism for moving the extractor to extract a shell.

The operation of our device may be described as follows: Assuming the extractor-lever D to be in the position shown in Fig. 1 and the breech mechanism in a closed position, when the carrier-plate 3 is swung to one side on the hinge 4 to open the breech the horn 18 of cam 17 on the carrier-frame first engages the horn 14 of cam 13 on the extractor, as shown in Fig. 2. The further movement of the carrier-frame 3, the breech-block B now being removed from the breech of the gun, causes the extractor-lever to rock slightly on the rolling fulcrum 16 on the inclined surface *c* of the recess C, thus starting the cartridge-shell E from the bore of the gun with great leverage. The continued movement of the carrier-frame brings horn 19 of cam 17 into engagement with horn 15, as shown in Fig. 3, at which point in the operation the horn 18 passes out of engagement with horn 14, and the lever D is further rocked on the fulcrum 16 through engagement of horn 19 only with horn 15 of cam 13. While the extractor is being rocked on the rolling fulcrum 16 the cam-slot 5 is changing its position with reference to the cam-shaped pivot-pin P in the position shown in Fig. 1 to the position shown in Fig. 4, in which latter position the surface 11 of the slot is seated against the surface 12 of the pin P, and a projection 20 on the lever is firmly seated in a corresponding depression 21 at the side of the rib 8 on the cam-shaped pin P. Continued pressure on horn 15 of the lever D will now cause the lever to rock upon the rib 8 as a fulcrum, since the slot in the lever is seated firmly against the pin and the shapes of the pin and slot are such that from the position shown in Fig. 4 the parts may finally assume the position shown in Fig. 5, in which the extractor-lever is shown rocked as far as the construction of the parts will permit.

As shown in Fig. 1, a spring S always tends to retract the extractor after it has once extracted a shell.

In Fig. 7 are shown parts of the extractor and carrier-frame in their relative positions when the breech of the gun is closed. As before, a pin P, cam-shaped in cross-section, is shown, while there is a cam-shaped slot 5 in the extractor-lever D'; but the cam-shaped portion 13' on the extractor-lever is of a somewhat different form than hereinbefore described, there being a horn 14' and a rather prominent horn 15' with a rather pronounced recess 14^2 adjacent the horn 15', and the position of the cam 13' on the lever D' with relation to the slot 5 should be substantially as shown.

The modified form of cam 17' on the carrier-frame is provided with a horn 18', which is the first to engage cam 13' at horn 14' when the extractor-lever is to be operated, rocking

the lever D′, as before described, while the horn 19′, shown in this modified form as a finger extending outwardly therefrom and to a substantial distance, is adapted to engage the recess 14^2 of cam 13′ and cause the lever D′ to finish its rocking for the extraction of a shell. Increased leverage and strength are obtained by this modification, which is more suitable for guns of large bore.

In the usual constructions of breech mechanism the pivot-pin of the extractor-lever is placed close to the side of the breech of the gun in order to reduce the space required for the parts, save material, and form a compact mechanism, and in such usual constructions the extreme length of lever-arm of the extractor when rocked on the pivot-pin is the distance between the center of the pin and the end of the extractor-lever. One way to increase this lever-arm and thus increase the quickness of operation would be to make the extractor-lever longer and place the pin farther away from the side of the gun; but for the reasons above stated it is desirable to have the pivot-pin as close to the gun as possible, and by our arrangement a much greater effective length of lever-arm is secured without moving the pin (which in our construction is a guide) farther away from the gun and without increasing the length of the lever itself. Thus by providing a bearing for the lever at the side of the pin away from the breech of the gun it is evident that the lever-arm of the extractor is increased by the distance of this bearing from the center of the pin, which, although a small increase in itself, amounts to a considerable relative increase in the length of the lever-arm and causes more rapid action when extracting the cartridge.

It will be seen that in our construction we provide the lever adjacent to its inner end with a bearing-face which bears upon the gun and arrange the pin close to the side of the gun with a bearing at the side of the pin farthest from the gun adapted to a bearing on the lever, while suitable means are provided for rocking the lever upon its bearings.

The particular form of pivot-pin we prefer is that described, provided with a bearing, as a projection or rib, which forms the second fulcrum for the extractor-lever, an inwardly-projecting portion of the lever being adapted to bear upon said rib.

It will also be seen that in our construction there is an extractor-lever having a suitable pivot piece or pin, cam-shaped in cross-section, controlling the movements of the lever through the coöperation of a cam-shaped slot in the extractor-lever, which slot engages the pivot-pin, while suitable means are provided which may be connected with the breech mechanism for actuating the extractor to extract the shell.

According to our invention the extractor-lever is provided with a suitable fulcrum on the gun, as a rolling fulcrum, and has a cam-slot loosely engaging a pivot-pin, the lever being also provided with an outer cam-surface adapted to be engaged by a suitable cam, which may be on the breech-operating mechanism, as on the carrier-frame, whereby the extractor is first rocked upon its fulcrum on the gun and then rocked on the cam-shaped pivot-pin, when the breech mechanism is opened.

We claim—

1. The combination with the breech of a gun, of an extractor-lever, a pin arranged close to the side of the breech, a bearing at the side of the pin farthest from the breech adapted to a bearing on the lever, and means for rocking the lever upon its bearings, substantially as described.

2. The combination with the breech of a gun, of an extractor-lever having a bearing-face adjacent to the inner end bearing upon the gun, a pin arranged close to the side of the breech and passing through an opening in the outer end of the lever, a bearing at the side of the pin farthest from the breech adapted to a bearing on the lever, and means for rocking the lever upon its bearings, substantially as described.

3. The combination with the breech of a gun, of an extractor-lever, a pin therefor arranged close to the side of the gun and provided with a bearing at the side away from the gun, and means for rocking the lever on said bearing to extract a shell, substantially as described.

4. The combination with the breech of a gun, of a pin supported by the gun close to the side of the breech, a bearing at the side of the pin away from the axis of the gun, an extractor-lever engaging said pin and having a fulcrum on said bearing, and means for rocking the lever on said bearing, substantially as described.

5. The combination with the breech of a gun, of an extractor-lever, a pin therefor arranged close to the side of the gun and provided with a projection on the side away from the gun, and means for rocking the lever on said projection to extract a shell, substantially as described.

6. The combination with the breech of a gun, of an extractor-lever having a fulcrum on the gun and provided with a cam-shaped slot, a pin arranged close to the side of the gun extending into said slot, a bearing-rib at the side of the pin away from the gun, and means for rocking the lever first on its fulcrum on the gun and then on said bearing-rib, substantially as described.

7. The combination with the breech of a gun provided with a recess in the walls thereof, of a pin supported on the gun close to the breech, a bearing-rib at the side of the pin away from the breech, an extractor-lever loosely engaging the said pin and bearing-rib and extending into said recess, and means for rocking the lever on said bearing-rib to extract a shell, substantially as described.

8. The combination with the breech of a gun, of an extractor-lever having a fulcrum on the gun and provided with a slot, a pin arranged close to the side of the gun and extending into said slot, a bearing-rib at the side of the pin away from the gun, and means for rocking the lever first on its fulcrum on the gun and then on said bearing-rib, substantially as described.

9. The combination with the breech of a gun, and a breech-operating mechanism, of a pin supported on the gun close to the side thereof, a bearing at the side of the pin farthest from the gun, an extractor-lever having a fulcrum on the gun and provided with a slot loosely engaging the pin and also provided with an outer cam-surface, and a cam on the breech-operating mechanism adapted to engage the outer cam-surface of the extractor-lever when the breech mechanism is opened, whereby said extractor-lever is first rocked upon its fulcrum on the gun and then on the bearing at the side of the pin, substantially as described.

10. The combination with the breech of a gun, pivoted carrier-frame, and operating-lever, of a pin supported upon the gun close to the side thereof, a bearing at the side of the pin farthest away from the gun, an extractor-lever having a rolling fulcrum on the gun and provided with a cam-slot loosely engaging said pin and also provided with an outer cam-surface, and a cam on the carrier-frame adapted to engage said outer cam-surface of the extractor-lever when the breech mechanism is opened, whereby the extractor-lever is first rocked upon its fulcrum on the gun and then on the bearing at the side of the pin, substantially as described.

11. The combination with the breech of a gun, and a breech-operating mechanism, of an extractor-lever having a fulcrum on the gun and provided with an outer cam-surface, a pin arranged close to the side of the breech, a bearing at the side of the pin farthest from the breech adapted to a bearing on the lever, and a cam provided with a finger extending therefrom on the breech-operating mechanism and adapted to engage the outer cam-surface of the extractor-lever when the breech mechanism is opened, whereby said lever is first rocked on its fulcrum on the gun and then on the bearing at the side of the pin, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN FORSYTH MEIGS.
LEIGHTON NEALE DAVIS MIXSELL.

Witnesses:
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C. E. LEIBERT.