

No. 682,535.

Patented Sept. 10, 1901.

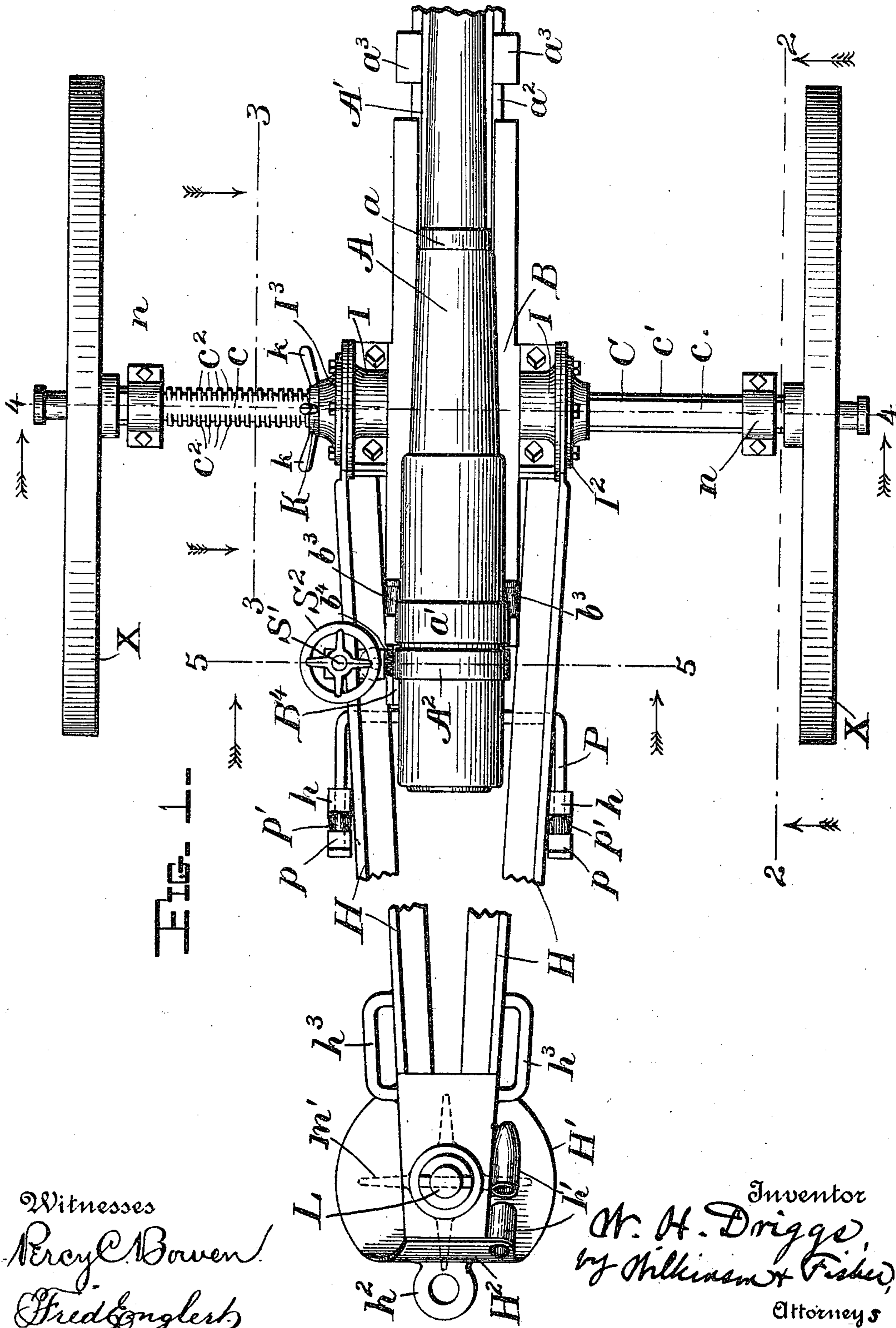
W. H. DRIGGS.

RECOIL MOUNT FOR ARTILLERY.

(Application filed Feb. 16, 1901.)

(No Model.)

5 Sheets—Sheet 1.



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5 Sheets—Sheet 2.

FIG. 2.

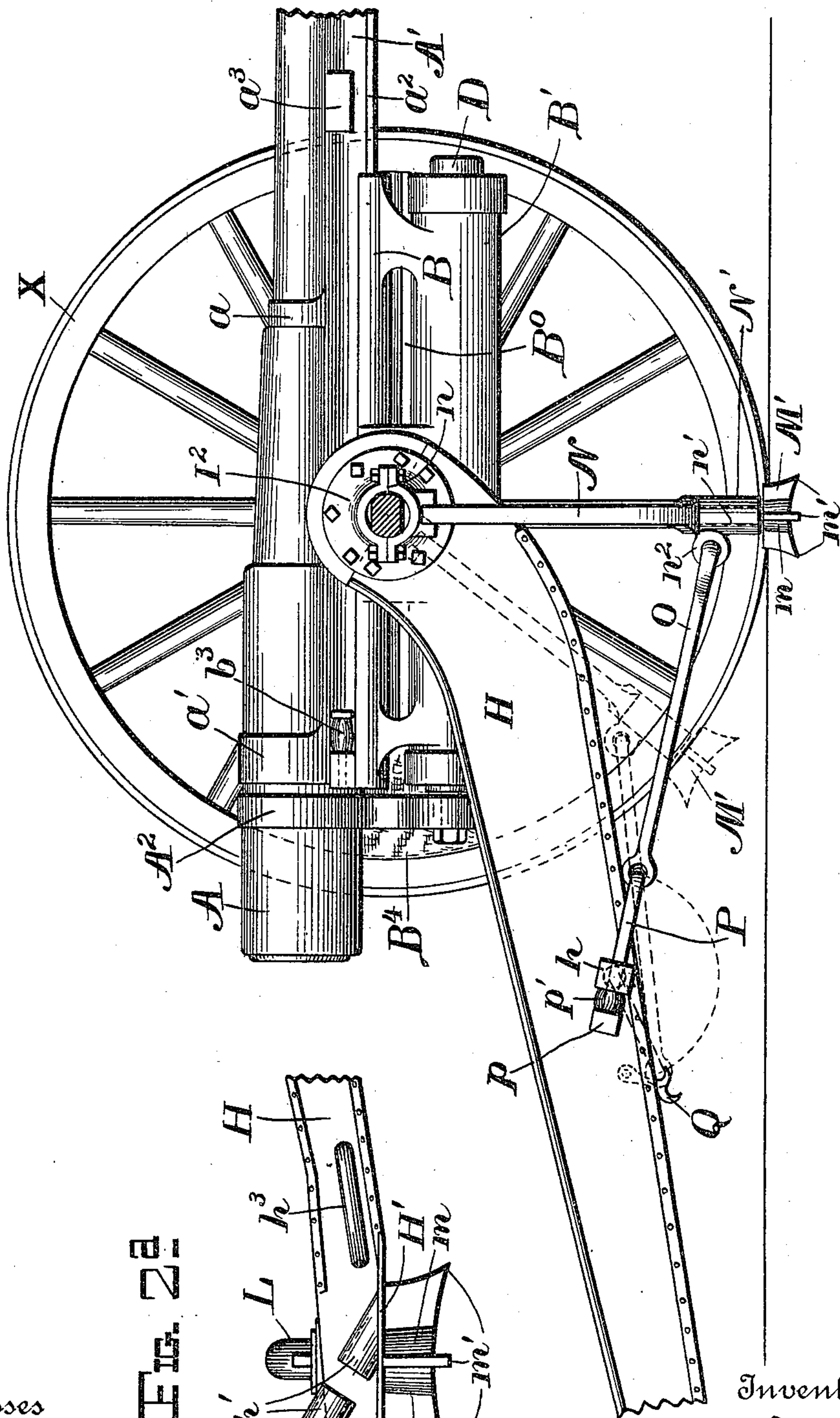


FIG. 2a

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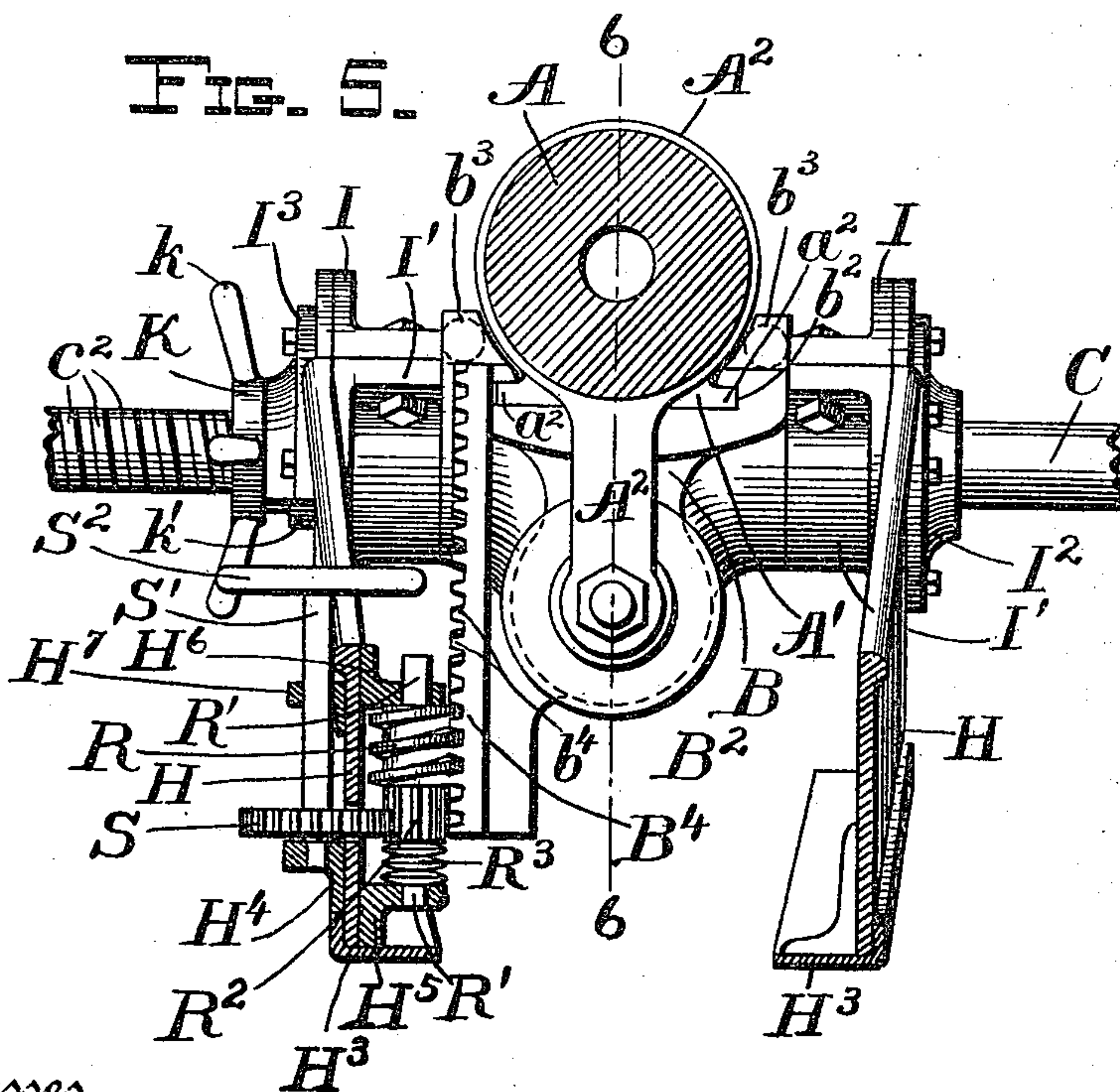
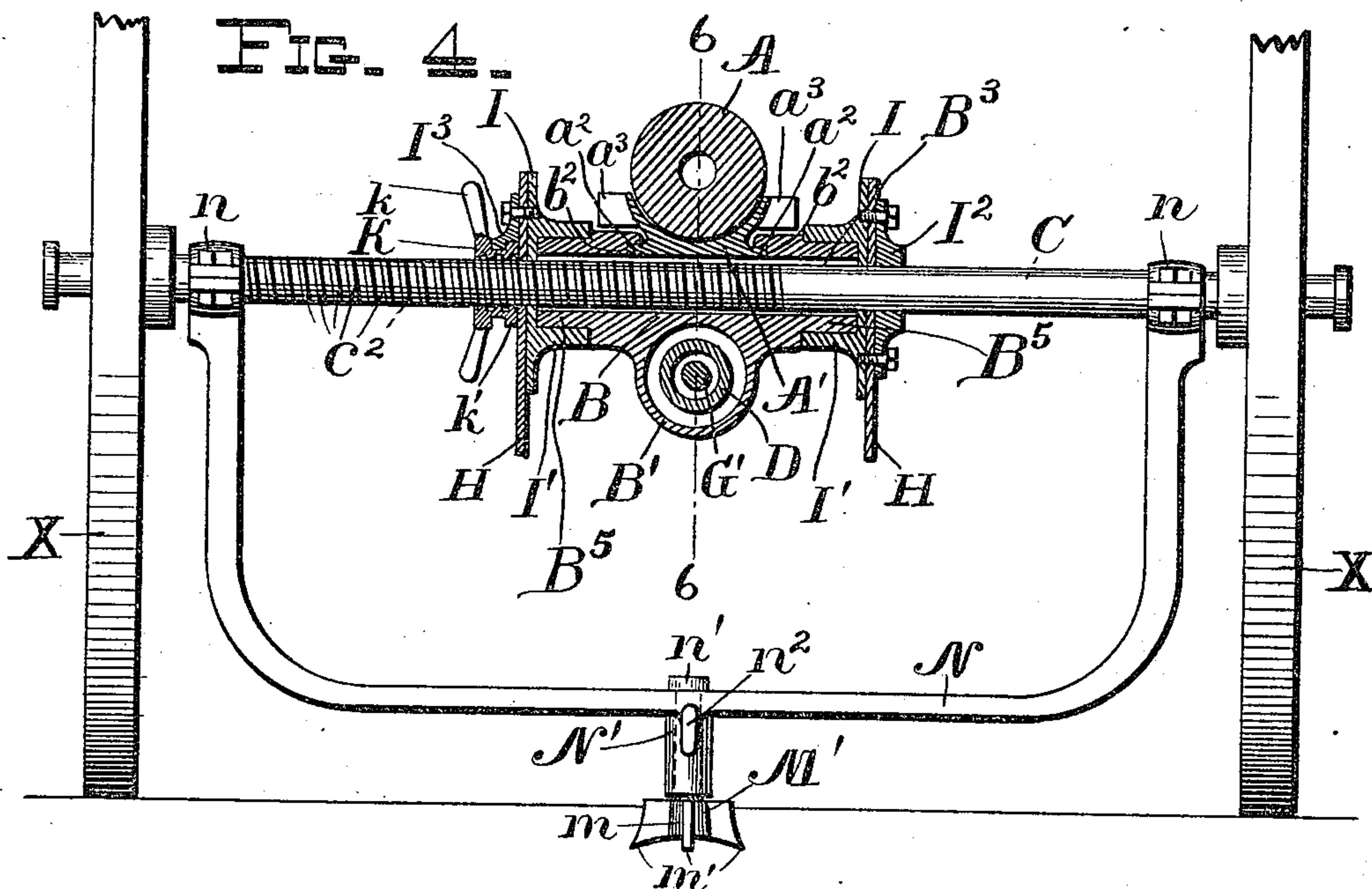
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5 Sheets—Sheet 4.



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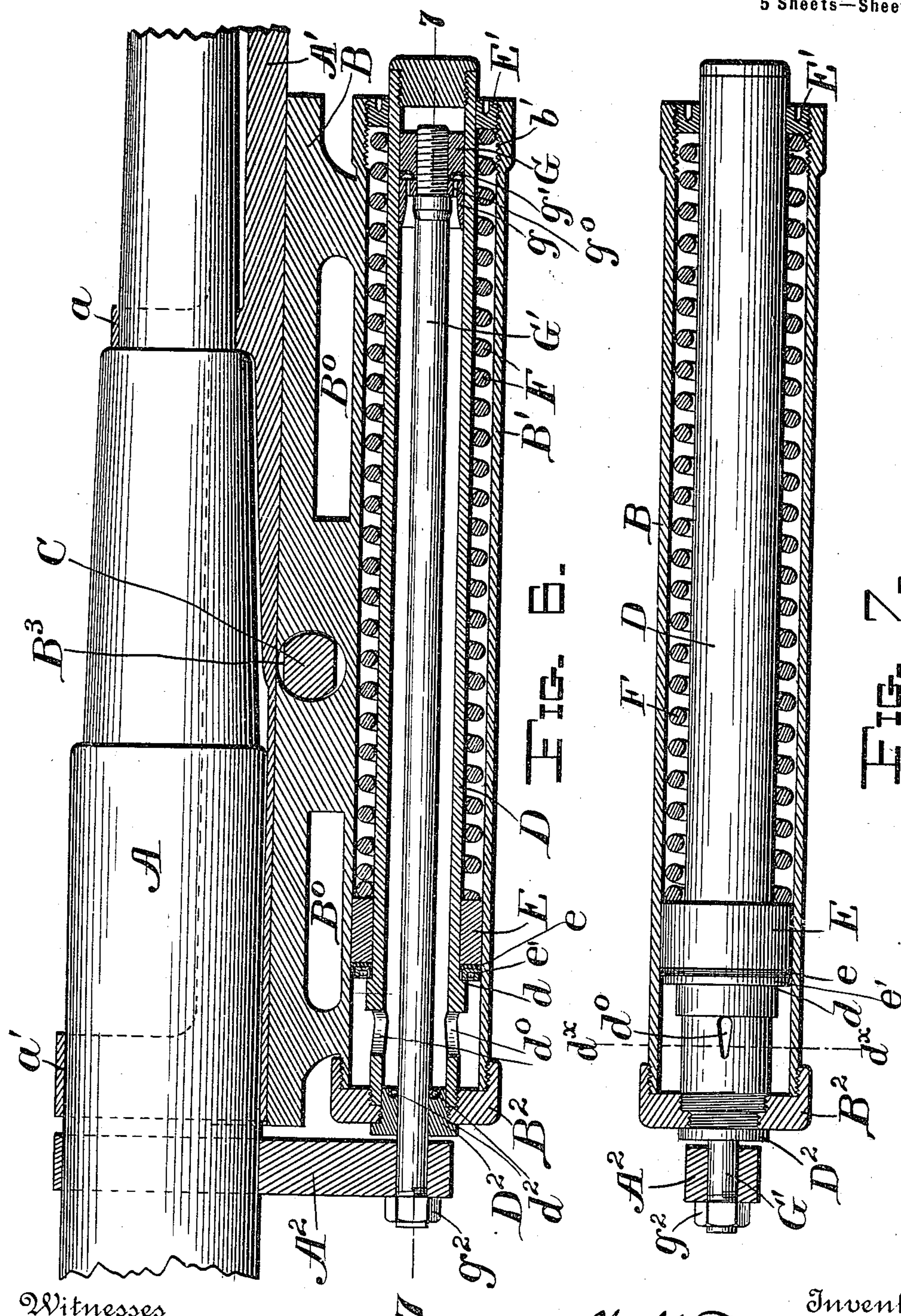
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W. H. DRIGGS.
RECOIL MOUNT FOR ARTILLERY.

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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

WILLIAM HALE DRIGGS, OF THE UNITED STATES NAVY.

RECOIL-MOUNT FOR ARTILLERY.

SPECIFICATION forming part of Letters Patent No. 682,535, dated September 10, 1901.

Application filed February 16, 1901. Serial No. 47,695. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HALE DRIGGS, commander United States Navy, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Recoil-Mounts for Artillery; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in recoil-mounts for breech-loading ordnance, and more especially to recoil-mounts for field-artillery, although it is capable of application to many of the types of guns now in use afloat and ashore.

My invention more particularly relates to guns of that type in which the gun is allowed to recoil through a much greater distance than that in which the recovery-spring acts, or, in other words, to that type of gun-mount in which that part of the recoil-check secured to the gun travels a longer distance than the recovery-spring is compressed.

My invention consists in an improved mount of this type in which the parts are firmly and compactly mounted, in which the weight of the gun and of the slide in which it is poised is carried above and below the axle, in which the parts are largely protected against curved or plunging fire, and in which the gun is provided with simple and durable elevating and training gear.

The invention further consists in certain novel features of construction and combinations and arrangements of parts, which will be hereinafter described and claimed.

Reference is had to the accompanying drawings, in which my invention is applied to the preferred type of mount—that is, a mount of field-artillery; but I do not mean to confine the invention to any particular kind of mount, except as specified in the claims.

Figure 1 represents a plan view of a field-piece and mount, parts being broken away. Fig. 2 represents a side elevation of the gun and trail, the axle being taken in section along the line 2 2 of Fig. 1. Fig. 2^a is a detailed view showing the rear end of the trail with the shoe and spade, it representing that portion of the mount broken off from the left

of Fig. 2. Fig. 3 is a sectional elevation of the gun and mount along the line 3 3 of Fig. 1 and looking in the direction of the arrows. Fig. 4 is a sectional elevation along the line 4 4 of Fig. 1 and looking in the direction of the arrows. Fig. 5 represents a sectional elevation along the line 5 5 of Fig. 1 and looking in the direction of the arrows. Fig. 6 is a section along the line 6 6 of Figs. 4 and 5 and looking to the left; and Fig. 7 represents a section along the line 7 7 of Fig. 6 and looking down, the recoil-cylinder and piston in the spring-cylinder being shown in elevation.

A represents the gun-body, which is carried in the sleeve A', which may be of any desired type; but in the device shown it is provided with two bands *a* and *a'*, shrunk on or otherwise rigidly secured to the gun, and with guide-ribs *a*², engaging in guideways *b*² in the rocking slide or cradle B. By having a long sleeve A', with long bearing-surfaces *a*² engaging the guideways in the cradle, the binding effect due to the downward component of the drag of the recoil-piston is largely obviated. The gun is also provided with the usual band A², near the breech and projecting downward, to which the piston-rod of the recoil-cylinder is secured.

The cradle B comprises on its upper side a slide with a guideway *b*² for the gun-sleeve A', as already described, and projects downward to form the spring-cylinder B', which may be either integral with or rigidly attached to the upper part of the slide. To insure lightness, the cradle is preferably cut away, as shown at B⁰, and is perforated near its center, as at B³, to slip loosely over the axle C. This axle is preferably straight longitudinally and is circular in section, except that the top and bottom are flattened, as at *c*, leaving the circular sides *c'*. The sides *c'* are cut with screw-threads *c*² through part of their length on the axle, as shown in Figs. 1 and 4. At one side the rear end of the cradle is formed into a web B⁴, having worm-teeth *b*⁴ for the elevating-gear.

The recoil of the gun is limited not only by the recoil-checks, which will be hereinafter described, but also by means of the stops *a*³ on the sleeve A' and the buffer *b*³, secured to the cradle. (See Figs. 1 and 2.)

The spring-cylinder B', which, as before

stated, may be integral with or secured to the cradle, is closed at one end by the screw-head B^2 and at the other by the screw-head E' , which is screwed into said cylinder, engaging the screw-threads b' and serving as a means for adjusting the tension of the recovery-spring F . This recovery-spring bears at its forward end on the annular cylinder-head E' and at its rear end on the annular piston E , which is provided with packing e , inclosed in the cup-ring a' , which cup-ring bears against the shoulder d on the recoil-cylinder D , which is concentric with the spring-cylinder B' . The front end of the recoil-cylinder D passes through the annular cylinder-head E' , while its rear end is screwed into the cylinder-head B^2 . The interior of the cylinder D is connected with the interior of the cylinder B' by means of suitable ports, which are preferably made tapered or coffin-shaped, as shown at d^0 . The recoil-piston G is secured to the piston-rod G' , which is attached to the band A^2 on the gun in any convenient way, as by means of the nut g^2 . In rear of this piston G I preferably provide a cup-shaped packing-ring g' , against which abuts the cup g , which is provided with passages g^0 opening into the annular space in the packing-ring g' .

D^2 represents any suitable cylinder-head for the cylinder D , which cylinder-head is screwed into the cylinder-head B^2 of the spring-cylinder and is provided with packing d^2 . When the gun recoils, the piston G is forced rearward, forcing the fluid in the cylinder D through the ports d^0 and into the annular space between the cylinders D and B' . This fluid will force the annular piston E forward, compressing the recovery-spring F . Just before the lug a^3 on the sleeve A' strikes the buffer b^3 on the cradle the cup g will pass over and nearly but not quite close the port d^0 , rapidly throttling down the passage of fluid from the inner cylinder to the outer and quickly checking any motion that is left in the gun on recoil. If the cup g should entirely close the port d^0 , the resiliency of the buffers b^3 would force the gun forward again far enough to leave a small opening near the end of the port, as indicated in dotted lines at d^x in Fig. 7. The gun having come to rest at the end of the recoil, the passage of fluid through this small opening in the ports d^0 will force the recoil-piston forward again, promptly opening the ports to their full extent and allowing the increased flow of fluid to bring the gun back to the "run-out" or firing position. By arranging the relative areas of the annular space between the cylinders D and B' and that between the cylinder D and its piston G' the forward travel of the piston E in compressing the spring may be made any desired proportion of the rearward travel of the piston G in checking the recoil of the gun. Thus a long recoil may be provided for the gun, and at the same time a comparatively short return-spring may be used.

It will be evident that as the gun recoils a partial vacuum will be created in the recoil-cylinder in front of the piston, which will assist in checking the recoil of the gun and will also assist in drawing the piston G forward on counter-recoil. This arrangement of recoil-checks and means for returning the gun to the run-out position is capable of being applied to gun-mounts of various kinds in which the cradle is trunnioned in any convenient way; but it is especially suitable for a field-mount in which the cradle rocks on a fixed axle, the weight of the recoil and spring cylinders and the other parts attached to or carried by the cradle being suspended beneath the axle and serving in a measure to counter-balance the weight of the gun and sleeve.

Referring now more particularly to this invention as applied to a field-mount, the trail includes the large cheek-pieces H , which terminate at the rear end in a shoe flanged outward, as shown at H' , and curved and bent upward, as at H^2 , this shoe being made in this form like the front end of a sled to prevent it from sinking into soft ground after the gun has been repeatedly fired. The rear end of the trail may be provided with handles h^3 , by means of which it may be lifted readily, with the socket h' for the trail hand-spike, and with the eye h^2 for the drag-rope. The socket h' is preferably made in two parts, as shown in Fig. 2^a, for convenience in cleaning out the same and preventing it from becoming clogged up with snow, ice, or mud. Beneath the shoe is placed the spade M , which is revolvably mounted on the pin L , passing through the heel of the trail. This shoe consists of the hoop portion m , mounted on the pin L , with a plurality of radial webs m' projecting from this hoop and terminating in downwardly-projecting points. This spade readily and rapidly adjusts itself to the configuration or quality of the ground and offers a strong holding means to restrain the trail from moving backward when the gun is fired. I also provide a similar spade M' , arranged beneath the axle, as shown in Figs. 2 and 3. This spade M' is revolvably mounted on a pin n' , held in the sleeve N' in the lower end of the hoop N , which is suspended from the axle, as at n . (See Fig. 4.) This sleeve N' is provided with an eye n^2 , connected by the link O to the loop P , which passes through the revolvable lugs h , connected to the cheek-pieces H of the trail. In rear of these lugs h the arms of the loop carry rubber disks p' , which bear against the nuts or shoulders p on the ends of this loop and yield somewhat when the gun is fired.

When the gun is in battery, the bows or loops N would be lowered in the position shown in Figs. 2 and 4; but when it is desired to move the piece the loops P are bent downward, as indicated in dotted lines in Fig. 2, and are then hooked up to the trail by means of the hook Q . The spade M' will then be lifted clear of the ground, as shown

in the dotted lines in Fig. 2, and it will be still further lifted when the carriage is limbered.

It will be seen that the spades M and M' will hold the carriage against recoil while the shock of the recoil is taken up gradually by the recoil-check during the long travel of the piston G in the recoil-cylinder D. The spade M being revolvably connected to the heel of the trail, the trail may be pivoted about the pin L, which may be done by means of the training-nut K, provided with the handle h and mounted on the screw-threaded portion of the axle. This nut is provided with a flange k', which engages under a corresponding shoulder of the plate I³, which is secured to the upper end of the cheek-piece H, and thus turning the nut in one direction or the other will train the gun through a small angle about the pivot L. The upper end of the trail is secured on the axle by means of the flanged plates I I' I² I³, which form a bearing which is free to slide laterally on but which turns with the axle as the trail is raised or lowered.

The cradle B is provided with an opening B³, which passes loosely over the axle, and at each end of this opening the cradle is provided with trunnions B⁵, which project into a bearing in the plates I and I', (see Fig. 4,) and thus the cradle is trunnioned to the trail and rocks freely over the axle.

Elevation is given to the gun by means of the elevating-gear, shown in detail in Fig. 5, where the shaft R' is journaled in the brackets H⁵ H⁶, secured to the cheek-piece H and the angle-piece H³ of the trail. This shaft carries the worm R, meshing in the worm-teeth b⁴ on the web B⁴ of the cradle, and the said shaft also carries the pinion R² and the cup-springs R³, the purpose of the latter being to yield to the downward thrust of the gun on recoil, and thus prevent accident to the elevating-gear. The pinion R² is rotated by means of the pinion S on the shaft S', which is turned by means of the hand-wheel S². This shaft S' is journaled in the brackets H⁴ and H⁷, fast to the cheek-piece H. It will be seen that the training-nut K and the elevating-wheel S² are close together and may be both operated by the same member of the gun's crew. The angle-pieces H³ are secured to the cheek-pieces H of the trail to give lateral stiffness to the latter; but any suitable form of trail may be adopted, if desired, provided the salient features of the invention are maintained.

It will be obvious that numerous modifications may be made in the herein-described apparatus and that various changes in the several details might be adopted which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In a recoil-mount for field-artillery, the

combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a recoil-check carried by said cradle below said axle and connected to the gun, and a sleeve mounted on said cradle and adapted to slide therein, and rigidly secured to the gun, substantially as described.

2. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder of smaller diameter also carried by said cradle and provided with ports opening into said spring-cylinder, a piston and spring in said spring-cylinder, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

3. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder mounted in and concentric with said spring-cylinder and provided with one or more ports connecting the two cylinders, an annular piston and a coil-spring in the annular space between said cylinders, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

4. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, with means for moving said trail laterally on said axle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a recoil-check carried by said cradle below said axle and connected to the gun, and a sleeve mounted on said cradle and adapted to slide therein and rigidly secured to the gun, substantially as described.

5. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, with means for moving said trail laterally on said axle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a spring-cylinder carried by said cradle below said axle, a re-

coil-cylinder of smaller diameter also carried by said cradle and provided with ports opening into said spring-cylinder, a piston and spring in said spring-cylinder, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

6. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle but held against turning thereon, and provided with journal-bearings for the cradle, with means for moving said trail laterally on said axle, a cradle provided with hollow trunnions inclosing said axle and journaled in said bearings in the trail, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder mounted in and concentric with said spring-cylinder and provided with one or more ports connecting the two cylinders, an annular piston and a coil-spring in the annular space between said cylinders, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

7. In a recoil-mount for field-artillery, the combination with an axle of a sleeve rigidly secured to the gun, a trunnioned cradle supporting said sleeve, a spring-cylinder of large diameter carried by said cradle below said axle, with a spring and piston in said cylinder, a recoil-cylinder of smaller diameter carried by said cradle and provided with one or more ports opening into said spring-cylinder, a piston in said recoil-cylinder, a piston-rod connecting the latter piston and the gun, a sector secured to or integral with said cradle with worm-teeth thereon, and worm-gearing engaging said teeth for elevating and depressing the gun, substantially as described.

8. In a recoil-mount for field-artillery, the combination with an axle of a sleeve rigidly secured to the gun, a trunnioned cradle supporting said sleeve, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder within and concentric with said spring-cylinder and provided with ports opening into said spring-cylinder, an annular piston interposed between said cylinders, a coil-spring mounted in the annular space between said cylinders, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, a sector secured to or integral with said cradle with worm-teeth thereon and worm-gearing engaging said teeth for elevating and depressing the gun, substantially as described.

9. In a recoil-mount for field-artillery, the combination with a guide, an axle of a sleeve rigidly attached to the gun, a trunnioned cradle provided with guideways and supporting said sleeve, a spring-cylinder rigidly secured to said cradle beneath said trunnions, a recoil-cylinder mounted in and concentric with said spring-cylinder with a port or ports opening from said recoil-cylinder into said spring-cylinder, an annular piston, and coil-

spring mounted in the annular space between said cylinders, a piston in the recoil-cylinder, a piston-rod rigidly connecting said gun and the latter piston, a sector secured to or integral with said cradle with worm-teeth thereon, and worm-gearing engaging said teeth for elevating and depressing the gun, substantially as described.

10. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle, a cradle provided with hollow trunnions inclosing said axle and journaled in said trail, a sector secured to or integral with said cradle with worm-teeth thereon, and hand-operated worm-gearing mounted in said trail and engaging said sector, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder of smaller diameter also carried by said cradle and provided with ports opening into said spring-cylinder, a piston and spring in said spring-cylinder, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

11. In a recoil-mount for field-artillery, the combination with an axle and wheels supporting the same, of a trail slidable on said axle, a cradle provided with hollow trunnions inclosing said axle and journaled in said trail, a sector secured to or integral with said cradle with worm-teeth thereon, and hand-operated worm-gearing mounted in said trail and engaging said sector, a spring-cylinder carried by said cradle below said axle, a recoil-cylinder mounted in and concentric with said spring-cylinder and provided with one or more ports connecting the two cylinders, an annular piston and a coil-spring in the annular space between said cylinders, a piston in the recoil-cylinder, and a piston-rod connected to the latter piston and to the gun, substantially as described.

12. A recoil-check for a field-carriage, comprising a substantially vertical pivot-pin secured to the trail, and a spade revolubly mounted on said pin, said spade comprising a central hub, and a plurality of pointed wings projecting therefrom and adapted to bite into the ground, substantially as described.

13. A spade for field-carriages, comprising a perforated hub, and a plurality of sharp-pointed wings projecting radially from said hub and adapted to engage in the ground, substantially as described.

14. In a field-mount for guns, the combination with a trail supported at its forward end on the axle and provided at its rear end with a shoe, and a spade revolubly mounted beneath said shoe, substantially as and for the purpose described.

15. In a field-mount for guns, the combination with a trail supported at its forward end on the axle and provided at its rear end with a shoe, flaring out laterally at H^1 and turned up rearwardly at H^2 , a pivot-pin mounted in said shoe, and a spade revolubly mounted on

said pivot-pin and beneath said shoe, substantially as described.

16. In a field-mount for guns, a revoluble spade provided with a plurality of sharp-
5 pointed radial wings symmetrically disposed about the axis of revolution of the spade and adapted to bite into the ground, substantially as described.

17. In a field-mount for guns, the combina-
10 tion with a trail adapted to slide at its forward end laterally on the axle, of a spade

revolubly secured to said trail and provided with a plurality of sharp-pointed radial wings symmetrically disposed about the axis of revolution of the spade, substantially as described. 15

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HALE DRIGGS.

Witnesses:

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