

No. 639,798.

Patented Dec. 26, 1899.

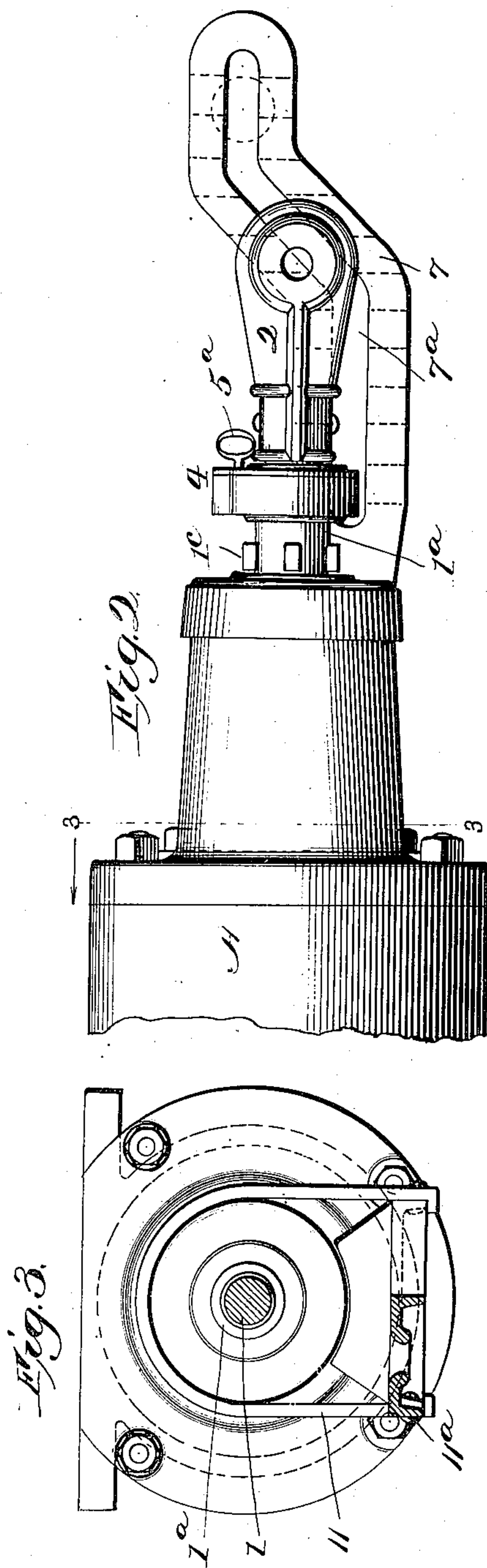
J. C. WANDS.

EXTENSION PUSH BAR AND SLACK ADJUSTER FOR BRAKE RIGGING.

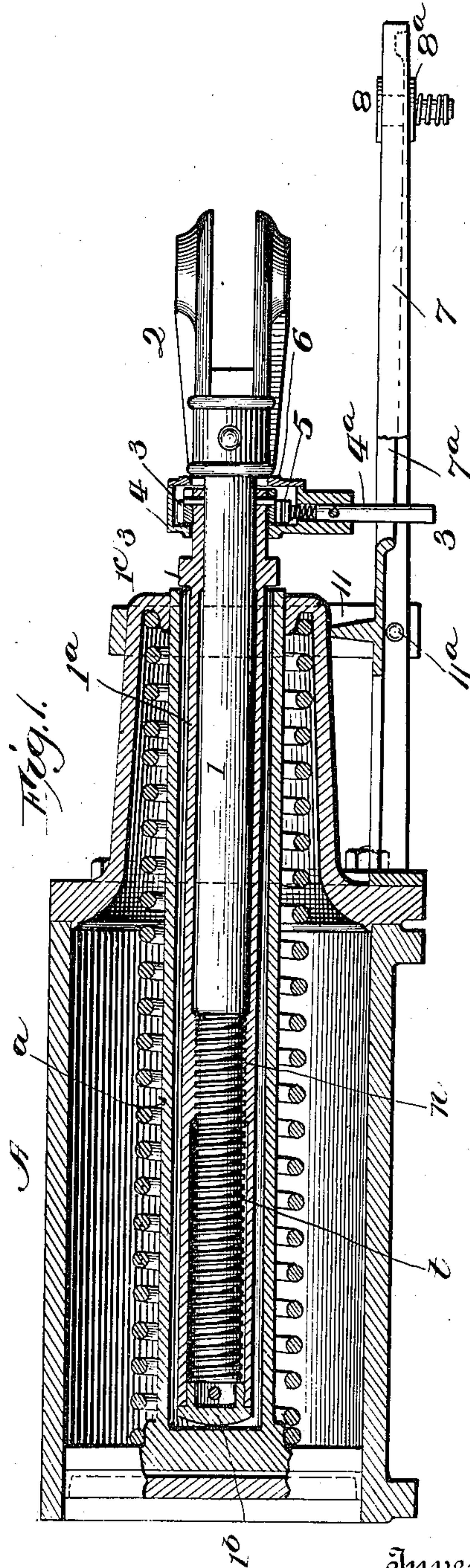
(Application filed Jan. 17, 1899.)

(No Model.)

5 Sheets—Sheet 1.



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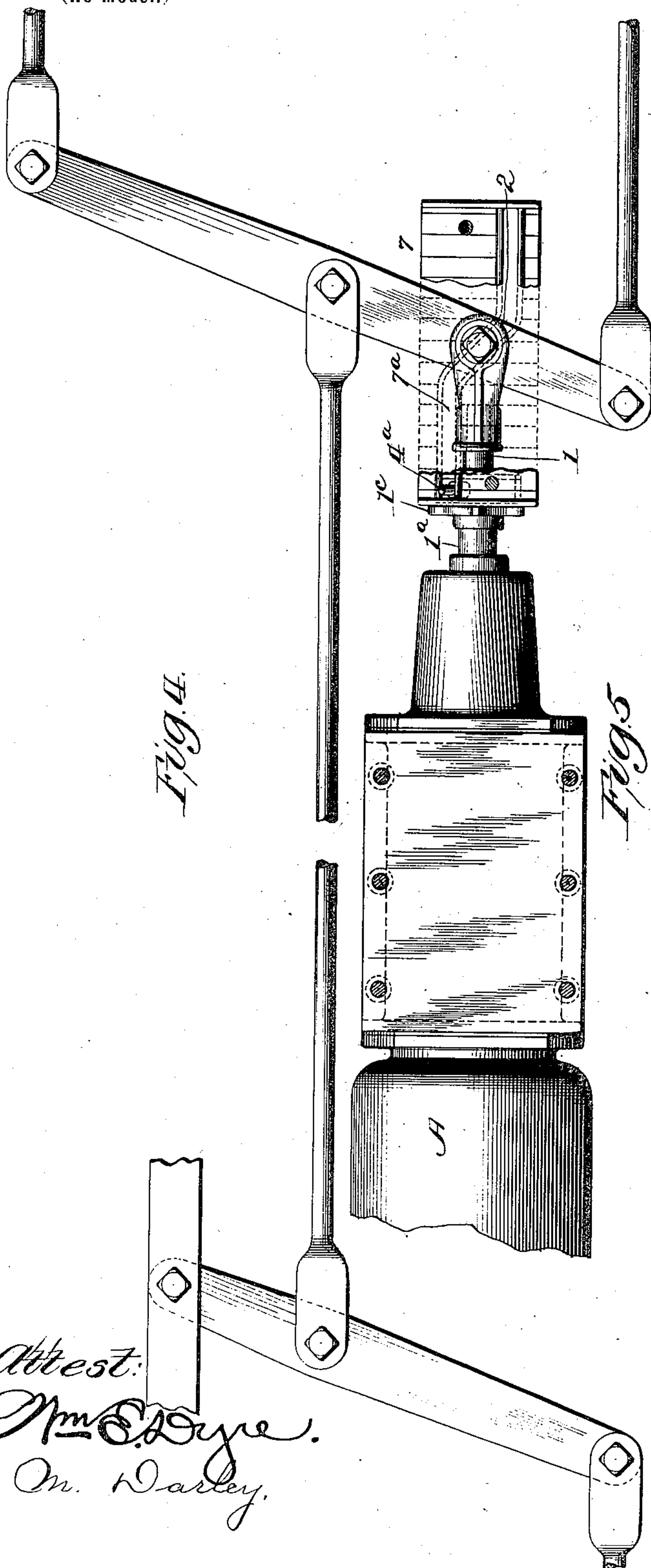
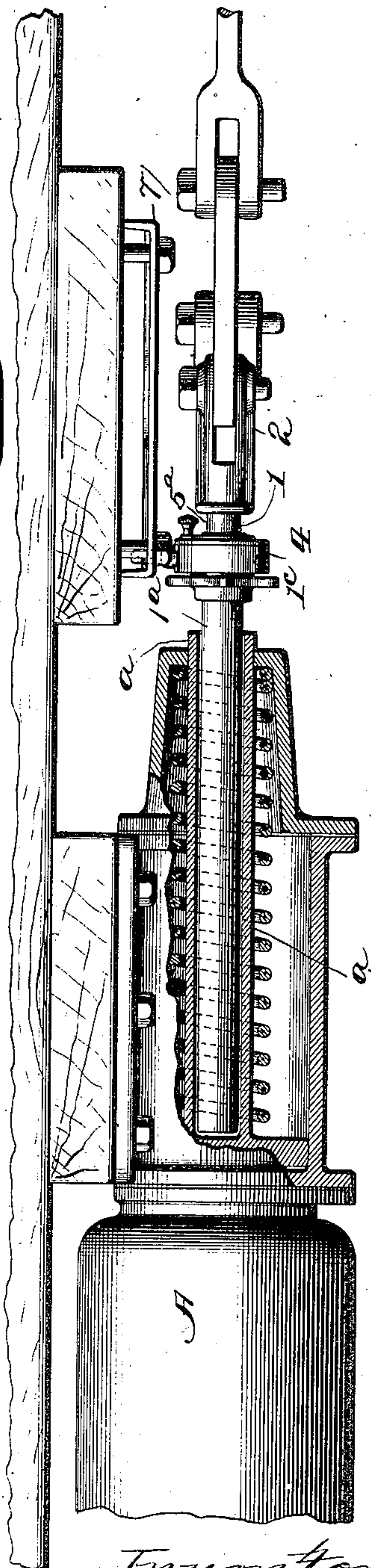


Fig. 4.

Fig. 5.



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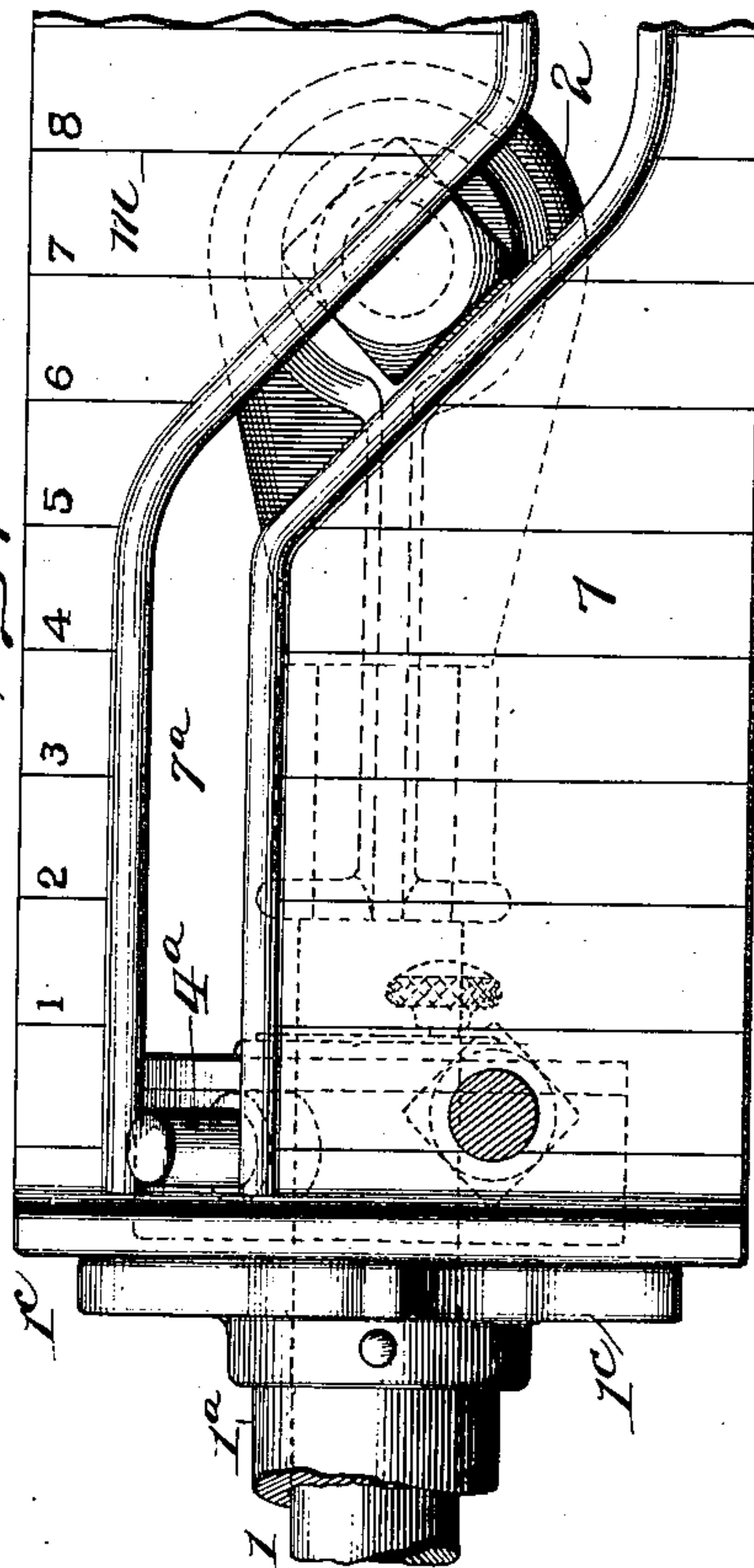
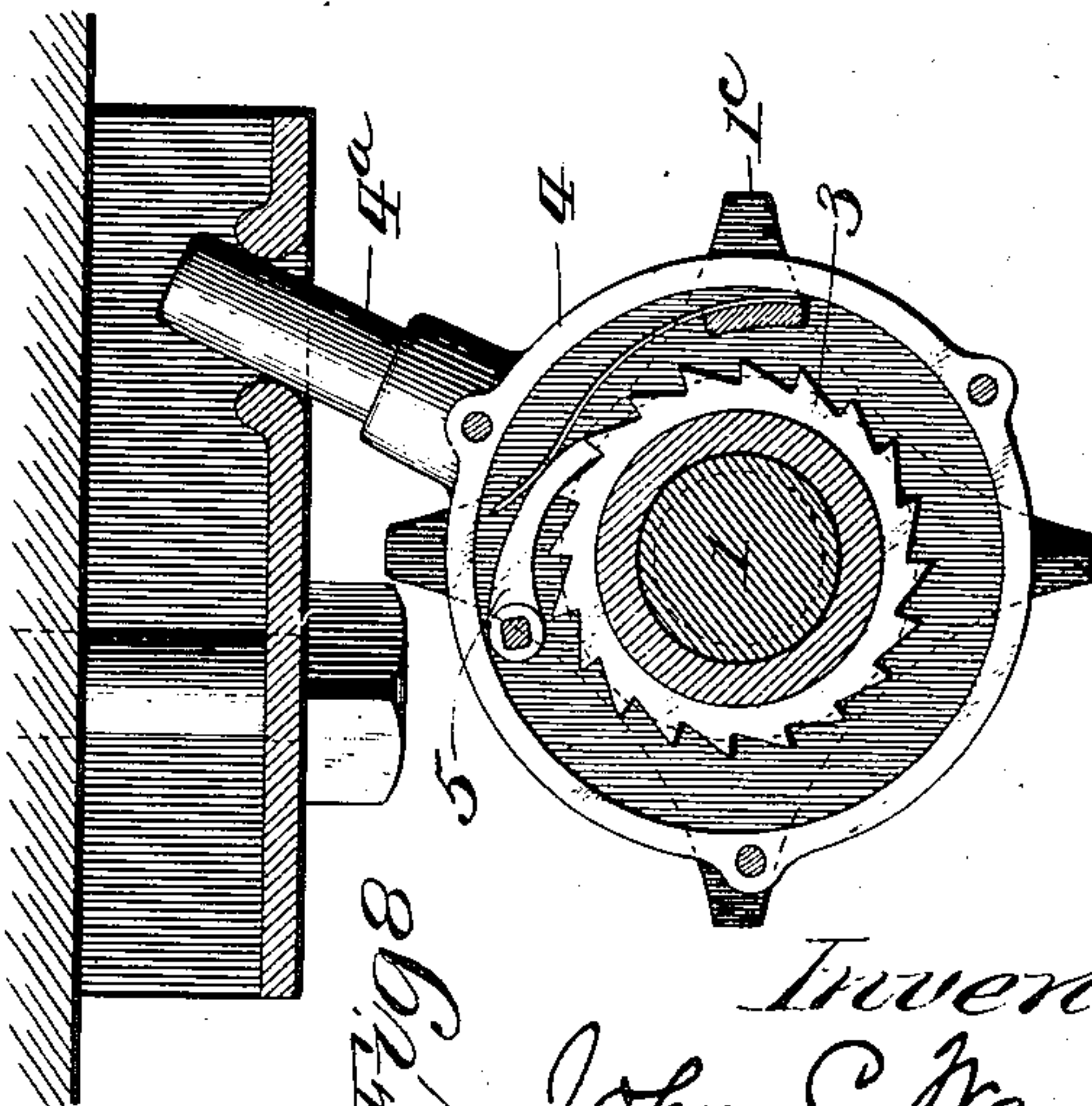
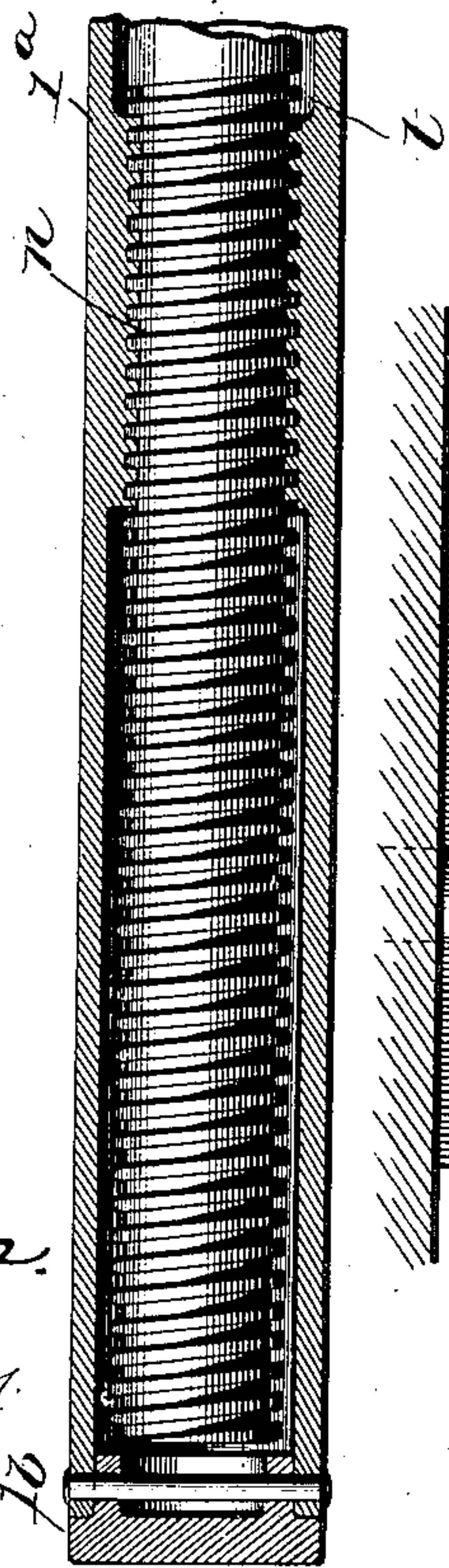
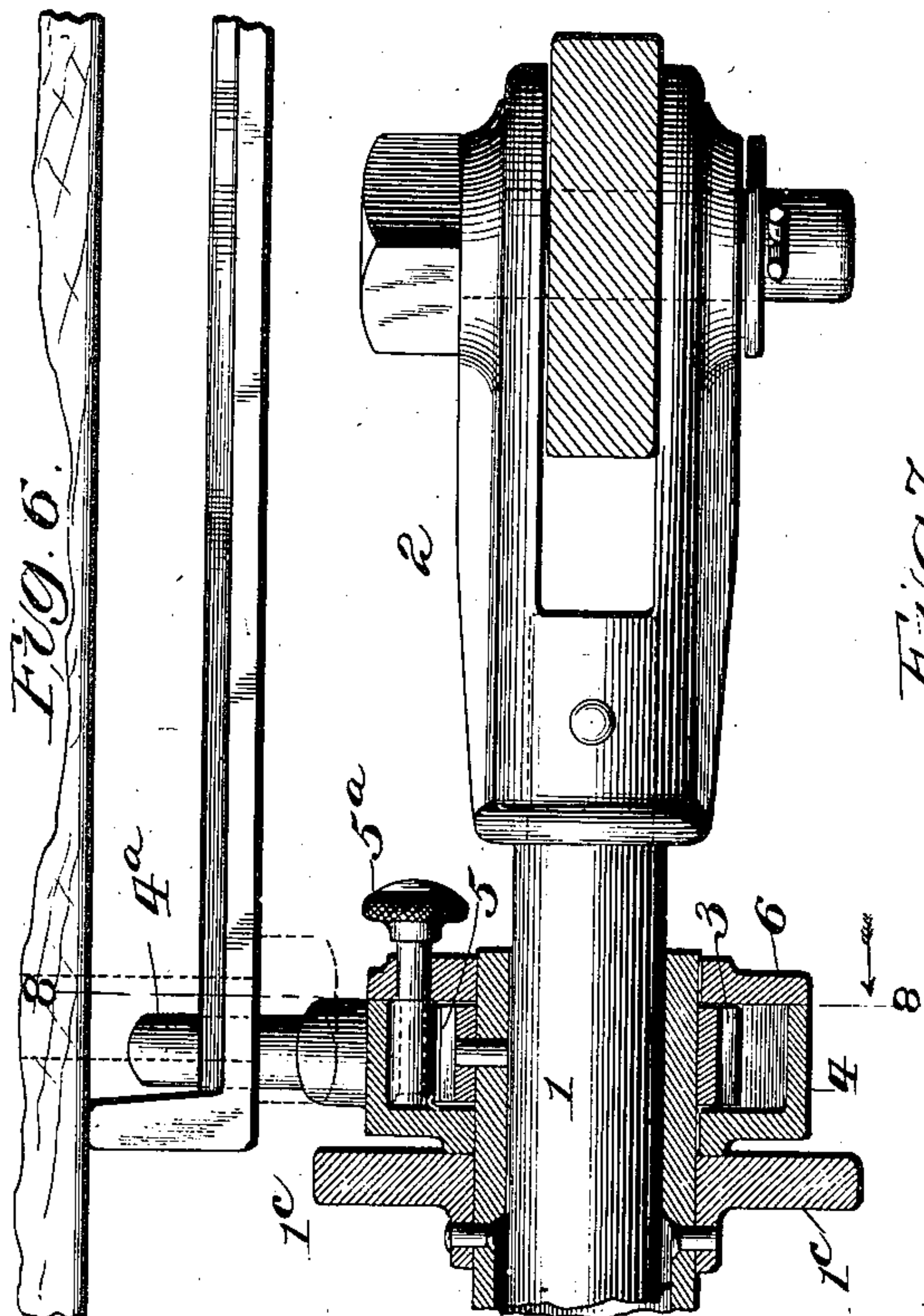
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5 Sheets—Sheet 3.



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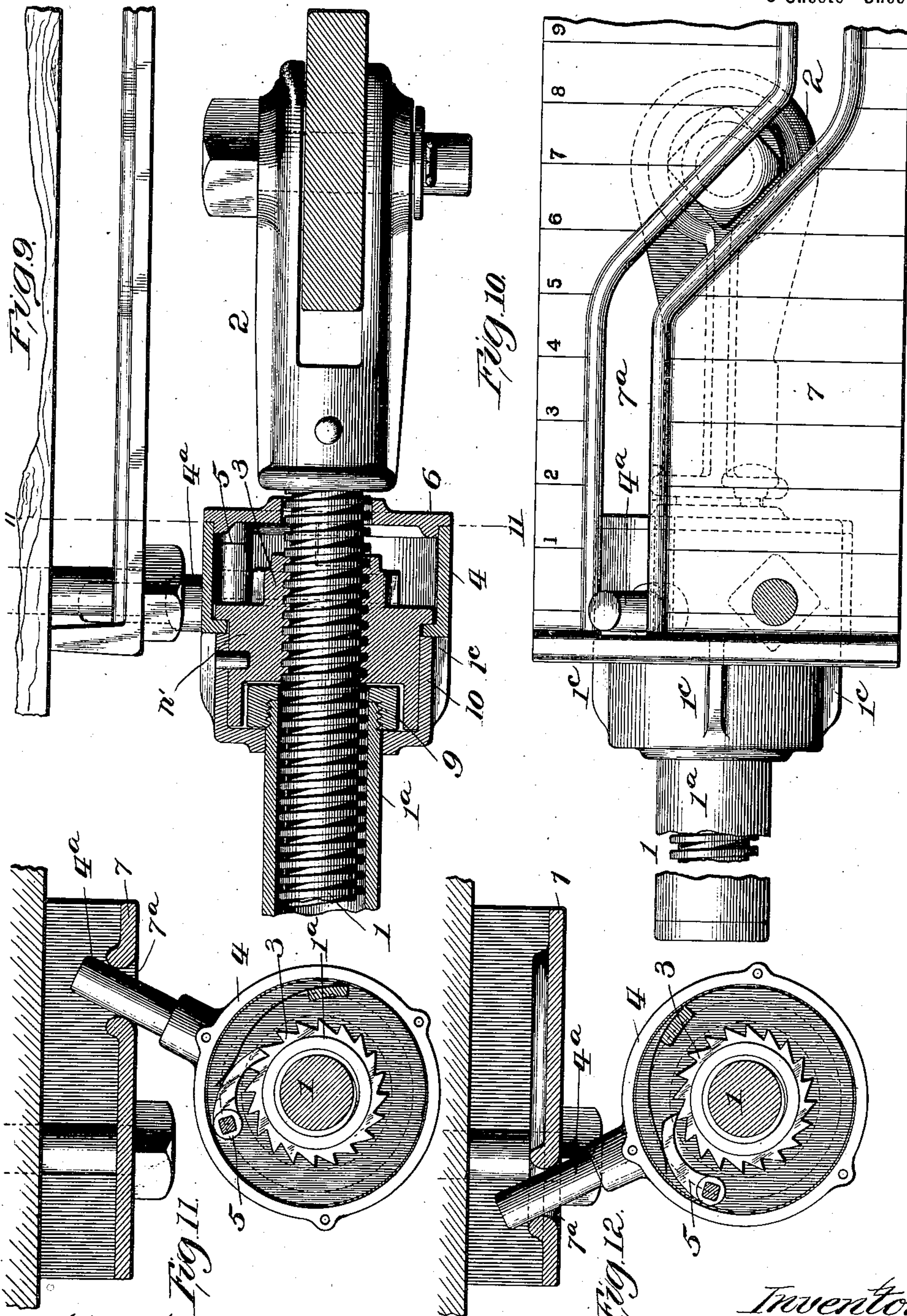
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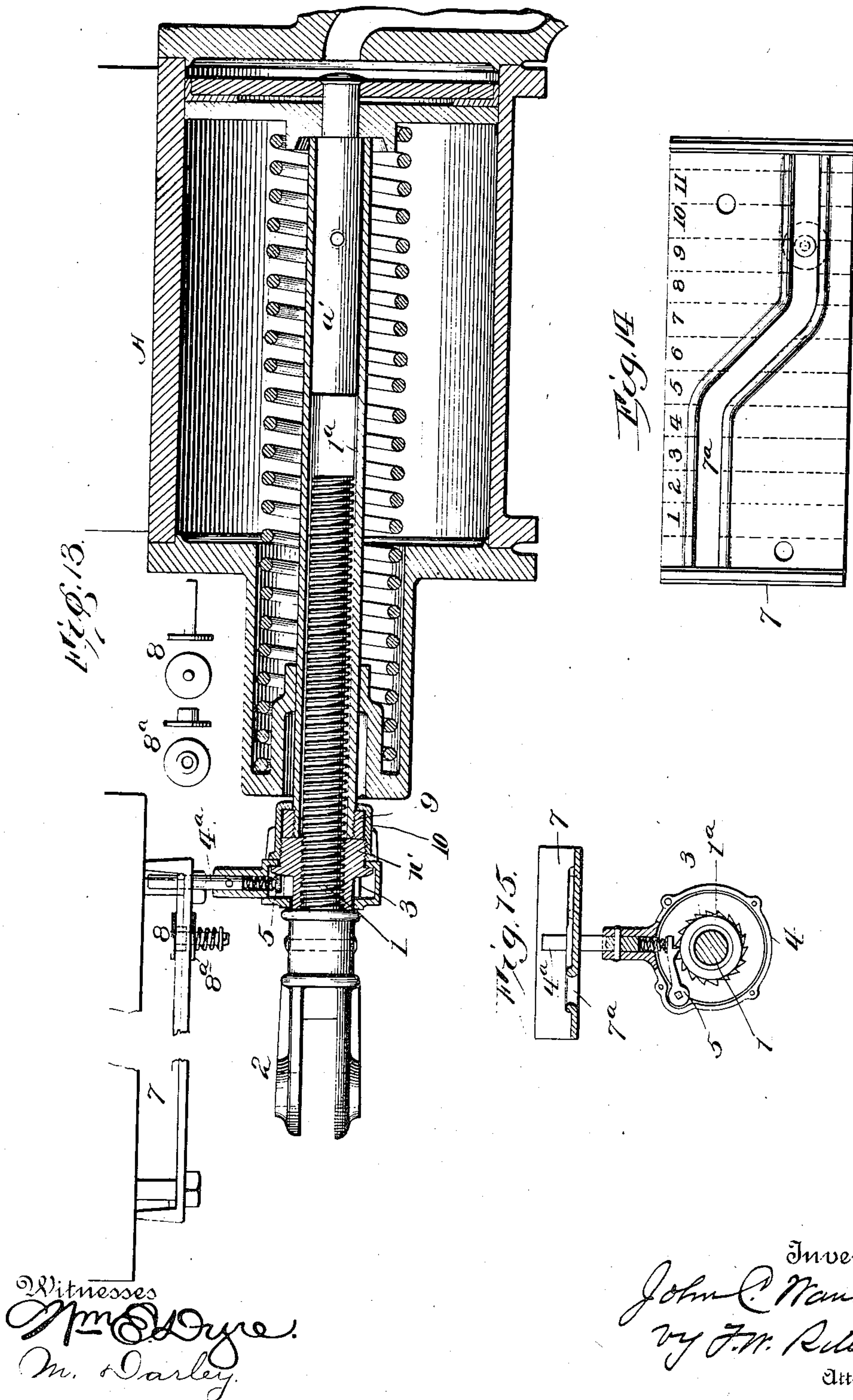
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(No Model.)

5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

JOHN C. WANDS, OF ST. LOUIS, MISSOURI.

EXTENSION PUSH-BAR AND SLACK-ADJUSTER FOR BRAKE-RIGGING.

SPECIFICATION forming part of Letters Patent No. 639,798, dated December 26, 1899.

Application filed January 17, 1899. Serial No. 702,457. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. WANDS, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Extension Push-Bars and Slack-Adjusters for Brake-Rigging; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a view of a freight-brake air-cylinder and its hollow piston-rod of the usual construction, together with an extensible push-bar, pawl-and-ratchet mechanism, and cam-plate embodying my invention, parts being in section to show the operation of the devices. Fig. 2 is a top or plan view of the same, portions of the air-brake cylinder broken off. Fig. 3 is a transverse section on the line 3 3, Fig. 2, looking in the direction of the arrow and showing the manner in which the cam-plate is supported from the air-brake cylinder. Fig. 4 is a plan view of a freight-brake cylinder, partly broken away, an extensible push-bar, pawl-and-ratchet devices, and a modified form of cam-plate, said view also showing portions of the brake-rigging levers, pull-rods, &c. In this figure the cam-plate for actuating the pawl-and-ratchet mechanism is attached to the bottom of the car in line with the cylinder-board. Fig. 5 is a side elevation of the devices shown in Fig. 4, partly in section. Fig. 6 is an enlarged detail view, in side elevation and partly in section, of the extensible push-bar, pawl-and-ratchet devices, and cam-plate shown in Figs. 4 and 5. Fig. 7 is an enlarged top or plan view of a portion of the cam-plate, the pawl-and-ratchet devices, and a portion of the push-bar and its clevis. Fig. 8 is a transverse section on the line 8 8, Fig. 6, looking in the direction of the arrow. Figs. 9, 10, 11, and 12 are enlarged detail sectional views of a modification in the construction of the extensible push-bar and pawl-and-ratchet mechanism. Fig. 13 is a longitudinal vertical central section of a passenger air-brake cylinder, showing the devices embodying my invention as applied in connection therewith; and Figs. 14 and 15 are detail plan and sectional views of

the cam-plate and pawl-and-ratchet mechanism, respectively.

Like symbols refer to like parts wherever they occur.

My invention relates to the construction of devices whose function is the elimination of slack from a brake-rigging system whether the same arises from shoe wear, stretching of the brake-rigging, or other of the several well-known causes which give rise thereto, and is especially applicable to the well-known air-brake systems, whether for freight or passenger service.

As is well understood by those skilled in the art, there is in air-brake service an appreciable difference, sometimes two or three inches, between the standing and running travel of the air-brake piston, and to be effective the slack must be measured while running or on the working stroke of the piston, but is preferably eliminated on the return or idle stroke of the piston. As is also well understood by those skilled in the art, in the case of freight-brakes the push-bar is moved independently of the air-brake piston whenever the brakes are applied by hand—as, for instance, in “shunting” or making a “running switch.” Consequently whatever the character of the slack-eliminating mechanism may be it should be so arranged and combined with the push-bar as to preserve or maintain the adjustment thereof with relation to the air-brake-cylinder piston or to readjust the same proportionate to the then existing slack of the system. To meet these several requirements of slack-adjuster mechanism in a simple and efficient manner is the object of my present invention, and the underlying principle as applied herein embraces generally the combination, with an extensible push-bar, of mechanism adapted to measure the slack on the working stroke of the piston (or outward movement of the push-bar) and cause the proportional and positive elongation of the push-bar on its return stroke or the idle stroke of the piston, and such a construction embodies the main feature of my invention.

In carrying out my invention I prefer to employ a sectional push-rod or push-bar, said sections having a screw adjustment, in com-

combination with ratchet-and-pawl mechanism, for effecting the elongation or extension of the rod or push-bar, and such a combination embraces one of the minor features of my invention.

Another minor or secondary feature of my invention embraces the combination, with the extensible push-bar or push-rod and the pawl-and-ratchet mechanism for elongating the same, of a cam-plate for measuring the slack and proportionately actuating the pawl-and-ratchet mechanism, whereby the extensible push-rod or push-bar is elongated to compensate therefor.

There are other features of invention, all as will hereinafter more fully appear.

I will now proceed to describe my invention more fully, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the air-brake cylinder, having in the case of freight-brakes the usual hollow or tubular piston-rod *a* for the reception of the push-bar.

In the case of air-brake cylinders for passenger service, (see Fig. 13,) where a solid piston-rod is employed, the same will be cut off, leaving a stump *a'*, to which a double-strength wrought-iron pipe will be secured, thus forming the equivalent of the hollow piston-rod of the freight-brake cylinder.

The extensible push-bar is preferably composed of a malleable tube-section 1^a, having a nut *n* on its interior (see Figs. 1 and 6) for the reception of the thread *t* on the rod-section 1, though, if desired, the tubular section may be plain, (see Figs. 9 and 13,) and the nut-section may be attached to or formed integral with the ratchet. The inner end of the tubular section 1^a of the push-bar will be closed by a plug 1^b or in other suitable manner, and the outer end may be provided with projections 1^c or equivalent means for grasping and turning the same independently of the rod-section 1.

1 indicates the rod-section, threaded, as at *t*, to engage the nut *n* of the tubular section and provided at its outer end with a clevis 2, with which a lever of the brake system is pivotally connected.

Secured to the outer end of tubular section 1^a of the push-bar is a ratchet-wheel 3, and inclosing the same and loosely journaled on said tubular section 1^a is a casing or housing 4, which carries a spring-pressed dog or pawl 5, which engages the ratchet-wheel 3. This dog or pawl 5 is provided with a handle 5^a, whereby it may be lifted out of engagement with the ratchet-wheel 3 when it is desired to reversely rotate the tubular section 1^a by means of the projections 1^c.

The casing or housing 4 is closed by means of an annular cap 6 and is provided with a projecting pin or lever 4^a, which enters a cam-slot 7^a in the cam-plate 7.

7 indicates a cam-plate provided with a cam-slot 7^a for the reception of the pin or lever 4^a of the casing 4, which carries the pawl or dog

5. This cam-slot 7^a extends in a straight line parallel with the axis of the piston-rod or push-bar for a distance substantially equal to the desired normal travel of the piston or push-bar in applying the brakes and then diverges on an oblique line, extending a sufficient distance to accommodate the movement of the push-bar through any excess or additional movement required to take up any possible slack, at which point the slot may terminate or again become parallel to the axis of the push-bar for a further distance. By preference this cam-slot 7^a is marked off in inches corresponding to the travel of the push-bar or piston-rod of the air-brake cylinder in applying the brakes. In the present instance from 1 to 5 (see Figs. 1, 7, and 10) indicates the normal travel of the push-bar in applying the brakes and from 5 to 8 the divergence of the cam-slot corresponding to excessive travel of the push-bar due to slack in the system, which excessive travel will proportionately actuate the casing 4 and dog 5.

8 indicates a gage arranged in the cam-slot 7^a to determine the maximum running travel of the piston, which gage may be removed when not in use for such purpose. This gage (see Figs. 1 and 13) consists of a stem or shank having a button-head and a spring-supported washer 8^a, whereby it is retained in the cam-slot 7^a of the cam-plate 7 and will be arrested and held at any point to which it is pushed by the outward or running stroke of the push-bar.

It will be noted that in the preferred form of construction of extensible push-bar illustrated in Figs. 1 and 6, wherein the nut *n* is within the tubular section 1^a, the screw-thread of the rod-section 1 is concealed and shielded from the weather, dust, &c.; but in the modified construction illustrated in Fig. 9 and also in the construction for passenger-service air-brakes, Fig. 13, where the tubular section is fixed or non-rotatable, the extension of the rod is necessarily effected by the rotation of nut *n'*, which is attached to and rotates with the ratchet-wheel. In said modifications (see Figs. 9 and 13) an annular screw cap or collar 9 is provided for the end of the tubular section 1^a of the push-bar, and a loose annular coupling-cap 10 incloses the collar 9 and is fastened to the nut *n'* and ratchet-wheel 3, so as to rotate with the nut, which projects the rod-section 1.

Where circumstances will permit, the cam-plate 7 may be attached to the bottom of the car on a line with the cylinder-board, (see Figs. 5 and 9;) but in many freight-cars where the push-bar has to pass under the needle-beam to get room I prefer to support the cam-plate 7 from the back head of the air-cylinder, which can be readily done (see Figs. 1, 2, and 3) by means of a wrought-iron strap or yoke 11, secured to the cam-plate by rivets 11^a or in other suitable manner.

The construction of the devices being of the general character hereinbefore pointed out, they will operate as follows: The rod-section

1 of the push-bar being substantially within the tubular section 1^a, as shown in the several figures of the drawings—that is to say, the extensible push-bar being at its shortest length and the hollow piston-rod substantially within the cylinder—the brakes will be applied in the usual manner by the admission of air to the brake-cylinders. This causes the outward travel or working movement of the push-bar, which continues until the brakes are set home and all slack is taken out of the system. During this movement the pin or lever 4^a of the housing or casing 4, which is carried by the push-bar, traverses the cam-slot 7^a in the cam-plate 7 and pushes the gage 8 before it. If no slack exists, the travel of pin or lever 4^a will not exceed the inner straight section of the cam-slot 7^a or normal movement, and the length of the push-bar will remain constant; but as soon as slack occurs the push-bar at its next movement in applying the brakes will necessarily exceed its normal movement or travel and will carry the casing pin or lever 4^a into the oblique section of the cam-slot and along the same in proportion to the amount of slack in the system. As the casing pin or lever 4^a diverges from the straight line it will proportionately rotate the casing 4 on the push-bar and cause the dog or pawl 5 to traverse a corresponding number of teeth of the ratchet-wheel 3, and the gage 8 will be advanced along the cam-slot, thus measuring the amount of wear or slack to be taken up. On the return or idle stroke of the push-bar the casing 4 and pawl 5 are given a reverse motion and, through the medium of ratchet 3 and nut *n*, (or *n'*, as the case may be,) project the rod-section 1 of the extensible push-bar from the tubular section 1^a thereof a distance equal to the slack existing in the brake-rigging system, whether the same has arisen from wear of the brake-shoes, stretching of the brake system, or other cause.

As hereinbefore noted, the standing and running travel of the air-brake piston and push-bar in applying the brakes may vary considerably. Consequently if the adjustments have been made by setting the brakes with the train at a rest it will be found upon applying the brakes when the train is in motion that slack and stretch exist in the system, and the amount thereof will be ascertained by noting the position in which the gage 8 is left when the train has been arrested and the brakes taken off.

By means of the handle 5^a the pawl or dog 5 may be lifted out of engagement with the ratchet 3, the tubular section 1^a may be rotated by means of the lugs or projections 1^c, and the final adjustment made to acquire the desired normal running travel of the piston in applying the brakes, after which the gage 8 may be removed for use on other cam-plates, if desired. Thereafter when wear occurs in the brake-shoes or other portions of the system it will be taken up from time to time by the automatic extension or elonga-

tion of the push-bar, and when brake-shoes are worn out and are to be replaced the pawl or dog 5 may be lifted out of engagement with the ratchet-wheel 3 and the rod-section 1 drawn into the tubular section 1^a the required distance in manner as previously pointed out herein.

In case of the freight-brake construction it will be noted that the extensible push-bar will be moved as a whole independently of the cylinder-piston, so that in hand-braking there will be no disarrangement of the necessary relations of the air-brake cylinder, piston, and push-bar, and no readjustment thereafter will be required when the power-brake is applied.

In the case of the passenger construction, Fig. 13, it will be noted that the extensible push-bar consists of the tubular section 1^a, secured to the stump *a'* of the piston-rod, in combination with the threaded rod 1, and as one section thereof is attached to the piston of the air-brake cylinder the extensible push-bar (which may be termed in said case an "extensible piston-rod") has no movement independent of the cylinder-piston.

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

1. In a slack-adjuster for brakes, the combination with the air-brake piston, of an adjustable piston-rod or push-bar the parts of which are connected by a screw mechanism, a pawl-and-ratchet mechanism for adjusting said parts, said mechanism mounted on the piston-rod or push-bar and traveling therewith, and a cam device arranged in the path of the pawl-and-ratchet mechanism at the extreme of the normal travel of the piston-rod or push-bar, substantially as and for the purposes specified.

2. In a slack-adjuster for brakes, the combination with the air-brake piston, of a positively-adjustable piston-rod or push-bar comprised of two parts having a thread and ratchet-nut connection, a pawl-carrier loosely journaled on the piston-rod or push-bar and provided with a pawl which engages the ratchet-nut, and a cam device arranged at the extreme normal travel of the piston-rod or push-bar for actuating the pawl-carrier by the excessive travel of the push-bar or piston-rod, substantially as and for the purposes specified.

3. In a slack-adjuster for brakes, the combination with an adjustable piston-rod or push-bar comprised of parts having a nut-and-screw connection, of a pawl-and-ratchet mechanism for positively adjusting said parts, said mechanism mounted on and traveling with the piston-rod or push-bar, and a cam device arranged at the extreme normal travel of the piston-rod or push-bar and supported from the brake-cylinder, substantially as and for the purposes specified.

4. In a slack-adjuster for brakes, the combination with a push-bar or piston-rod com-

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 5 prised of parts having a thread-and-nut connection whereby the parts may be positively adjusted and held, of a pawl-and-ratchet mechanism for adjusting said parts of the piston-rod or push-bar one on the other, said
 10 pawl-and-ratchet mechanism mounted on and traveling with the push-bar or piston-rod, and means arranged at the extreme normal travel of the piston-rod for actuating the pawl-and-ratchet mechanism by the excessive travel
 15 of the piston, substantially as and for the purposes specified.

5. In a slack-adjuster for brakes, the combination with a push-bar comprised of an internally-threaded sleeve-section and a threaded rod-section, said push-bar movable longitudinally in the hollow piston-rod of a brake-cylinder, of means mounted thereon exterior to the cylinder for rotating one section
 20 upon the other, substantially as and for the purposes specified.

6. In a slack-adjuster for brakes, the combination with a push-bar comprised of a sleeve and a rod section said parts having a thread-

and-nut connection, of pawl-and-ratchet 25 mechanism mounted thereon and arranged to cause the extension of the parts comprising the piston-rod or push-bar, and means arranged in a plane parallel with the path of the push-bar or piston-rod and at the extreme 30 of its normal travel for actuating the pawl-and-ratchet mechanism by the excessive travel of the push-bar or piston-rod, substantially as and for the purposes specified.

7. In a slack-adjuster for brake-rigging, 35 the combination with a cam-plate for actuating the adjuster mechanism, of a gage having a button or head provided with a shank and a spring-pressed washer, said gage arranged in the slot of the cam-plate, substantially as and for the purposes specified. 40

In testimony whereof I affix my signature, in presence of two witnesses, this 14th day of January, 1899.

JOHN C. WANDS.

Witnesses:

HUGH K. WAGNER,
 RALPH KALISH.