

No. 637,563.

Patented Nov. 21, 1899.

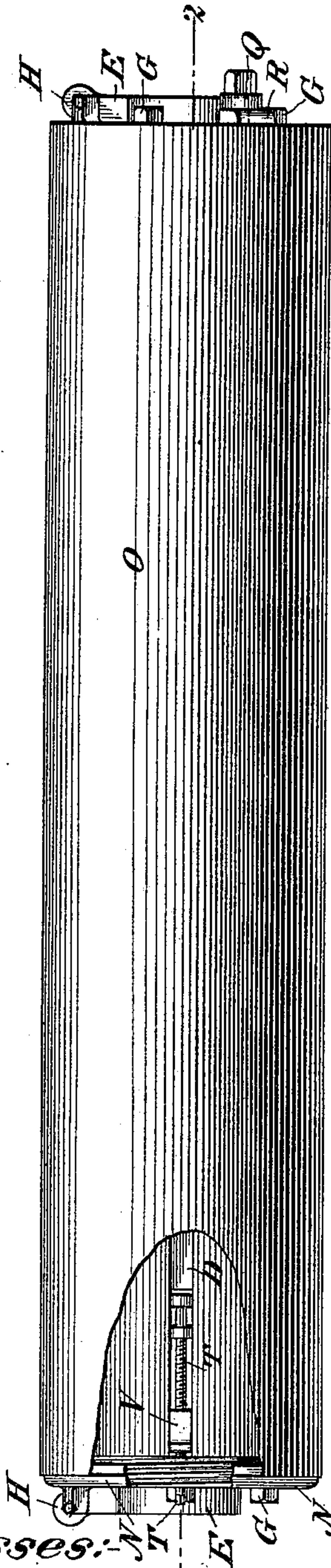
E. HETT.
FORM CYLINDER.

(Application filed Nov. 7, 1895. Renewed Jan. 20, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



Witnesses:

B. H. Raymond

C. Julius Pufke

Fig. 9.

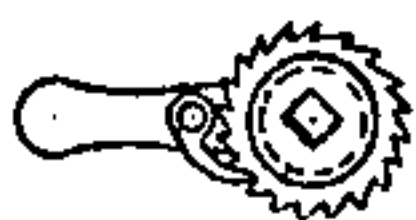
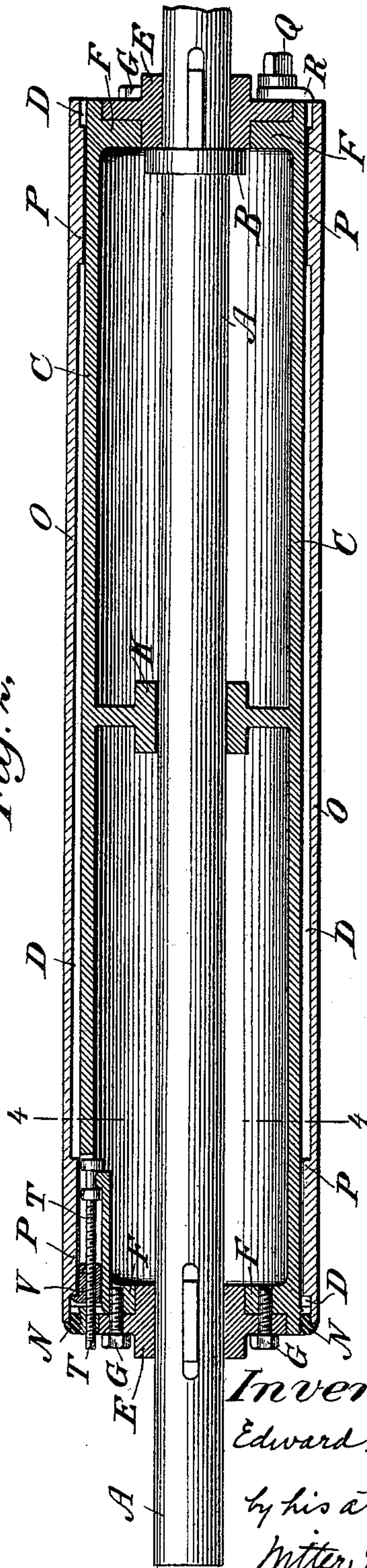


Fig. 2.



Inventor:

Edward Hett

by his attorneys
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No. 637,563.

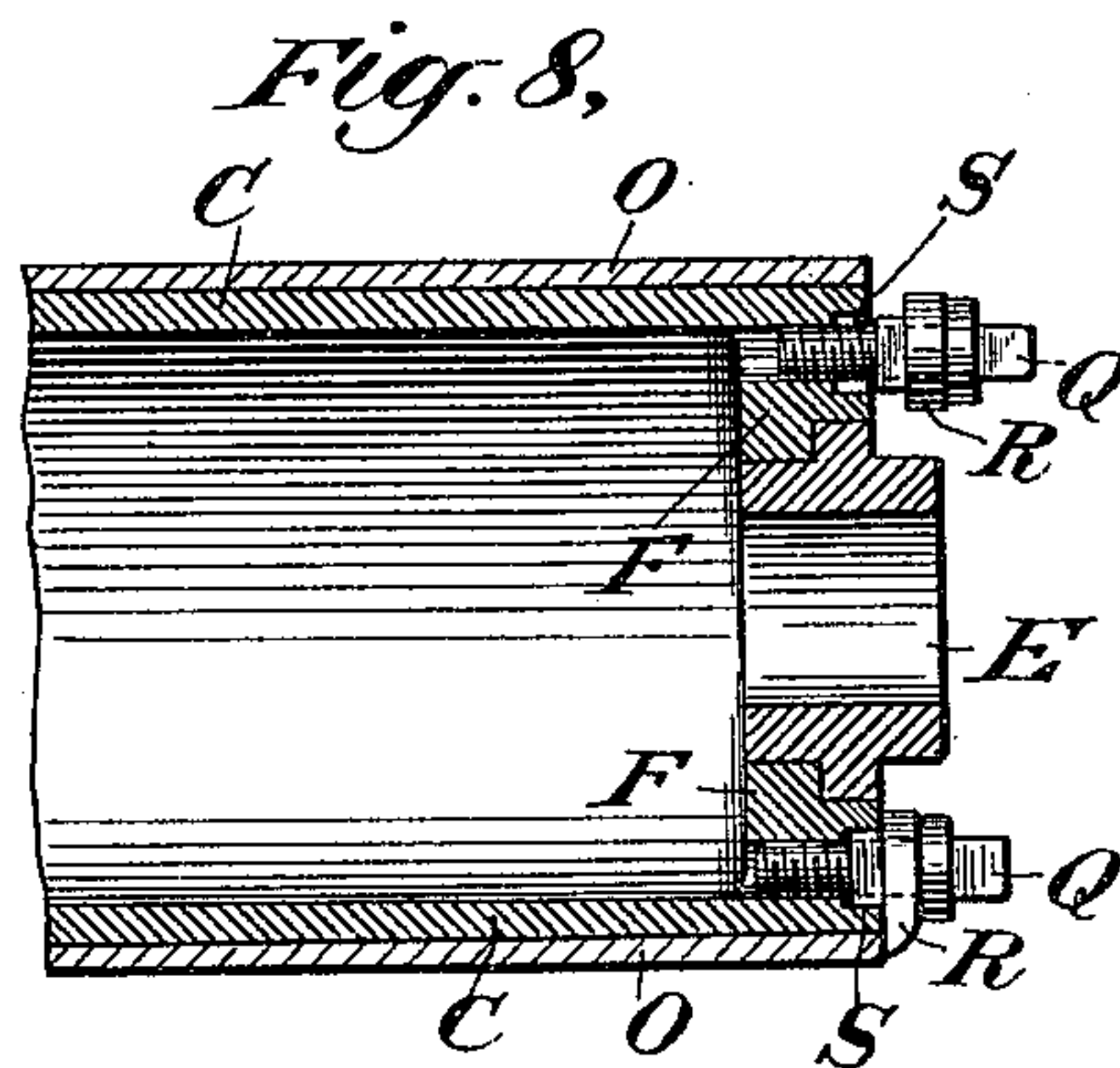
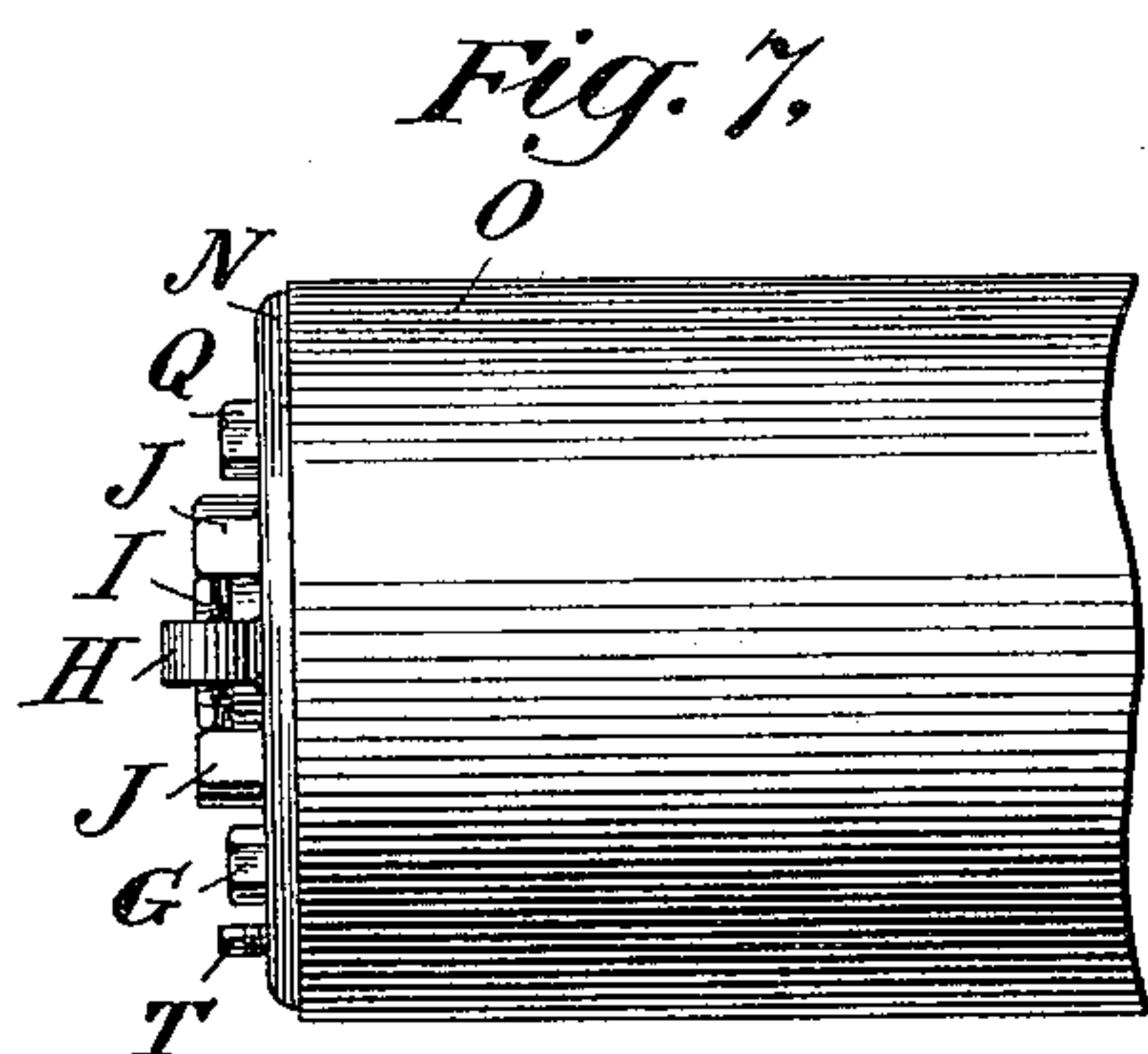
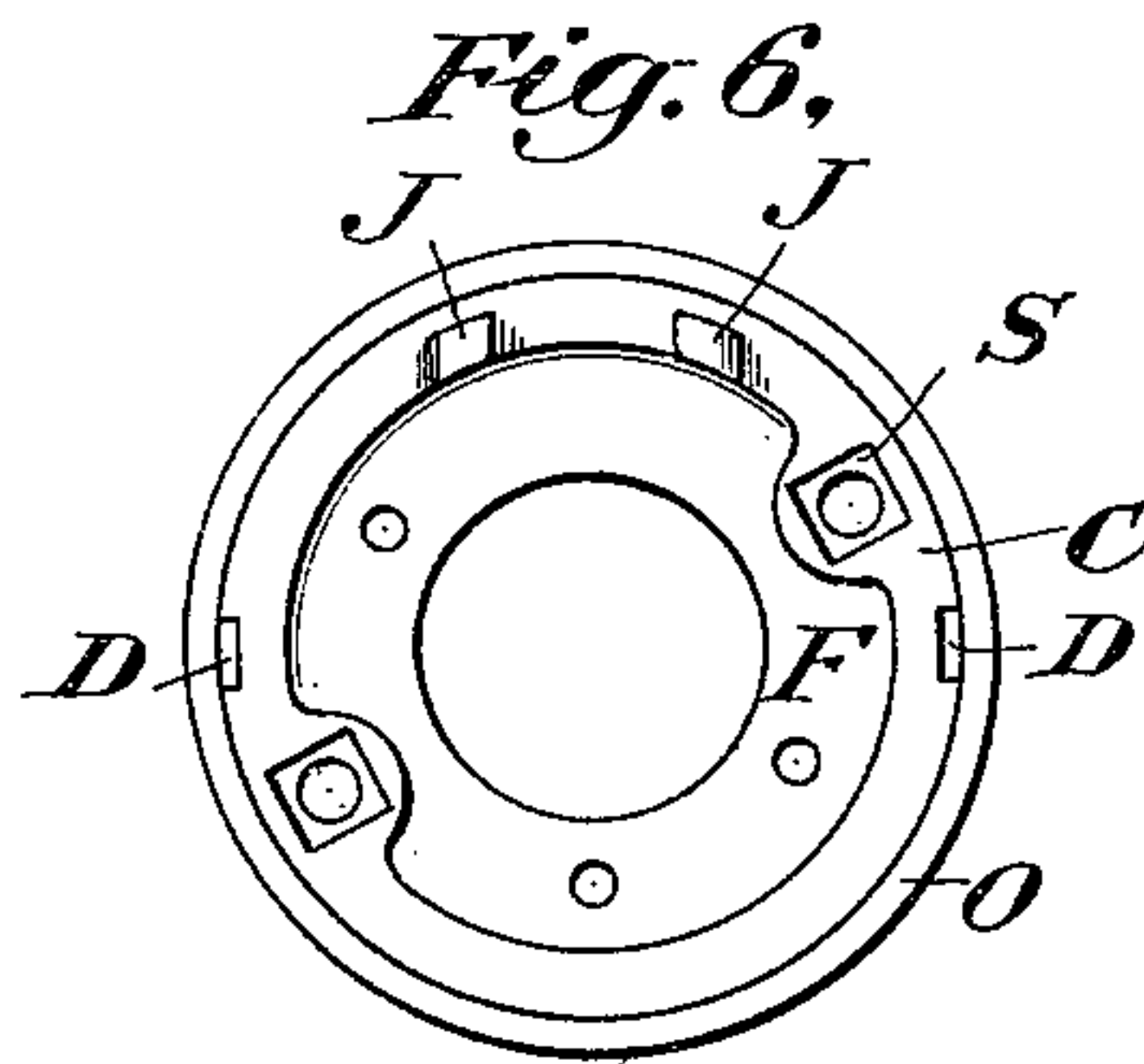
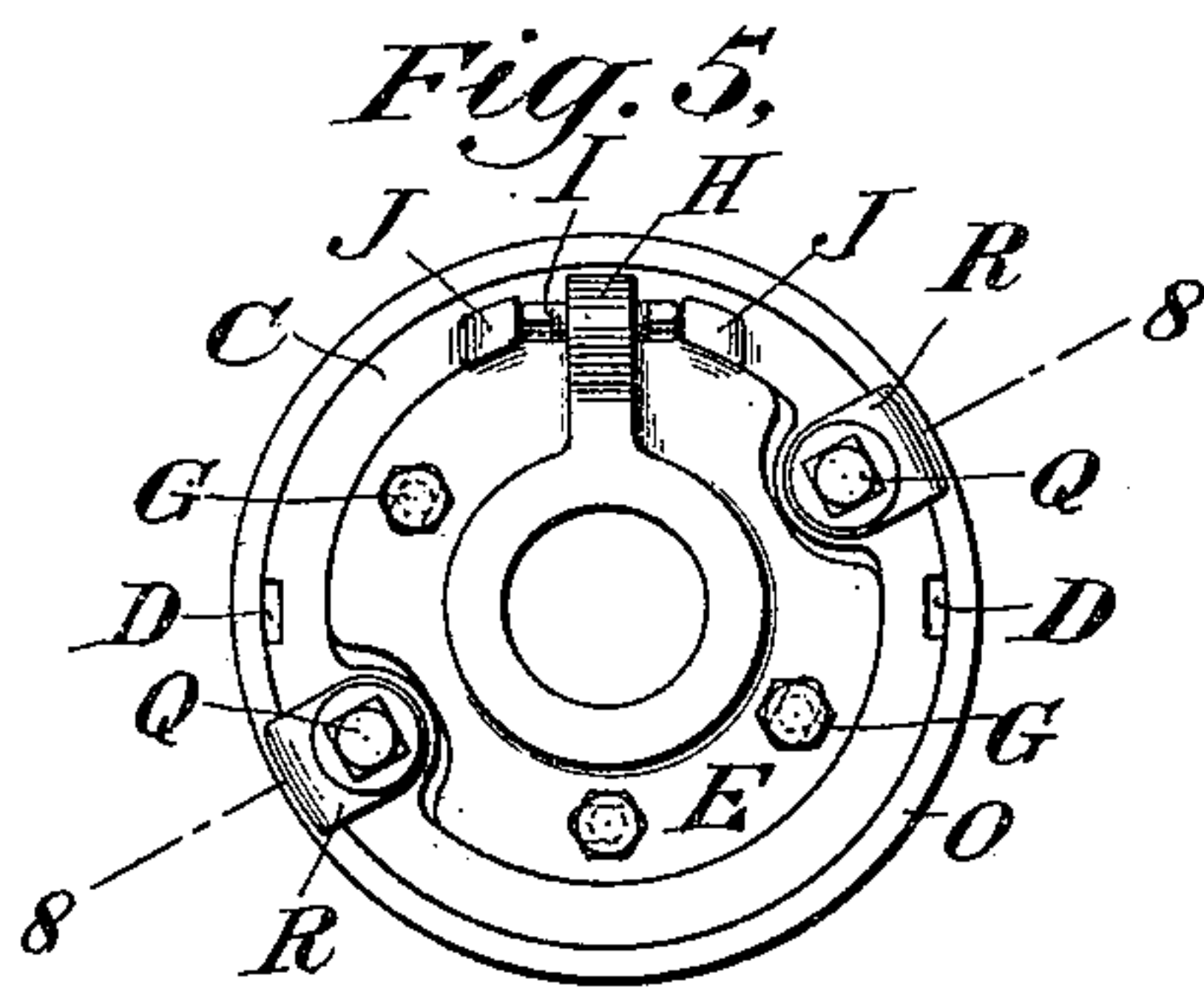
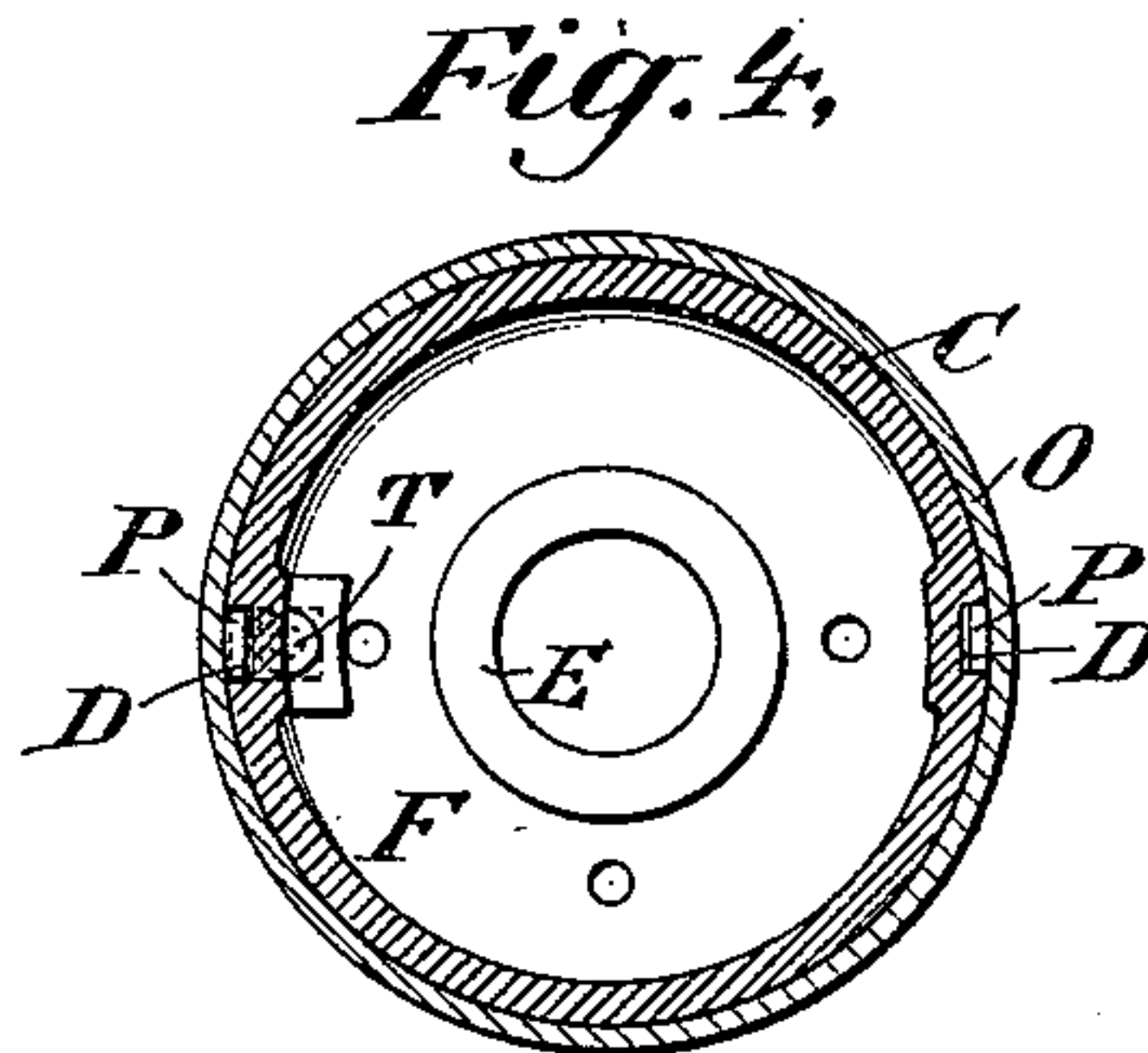
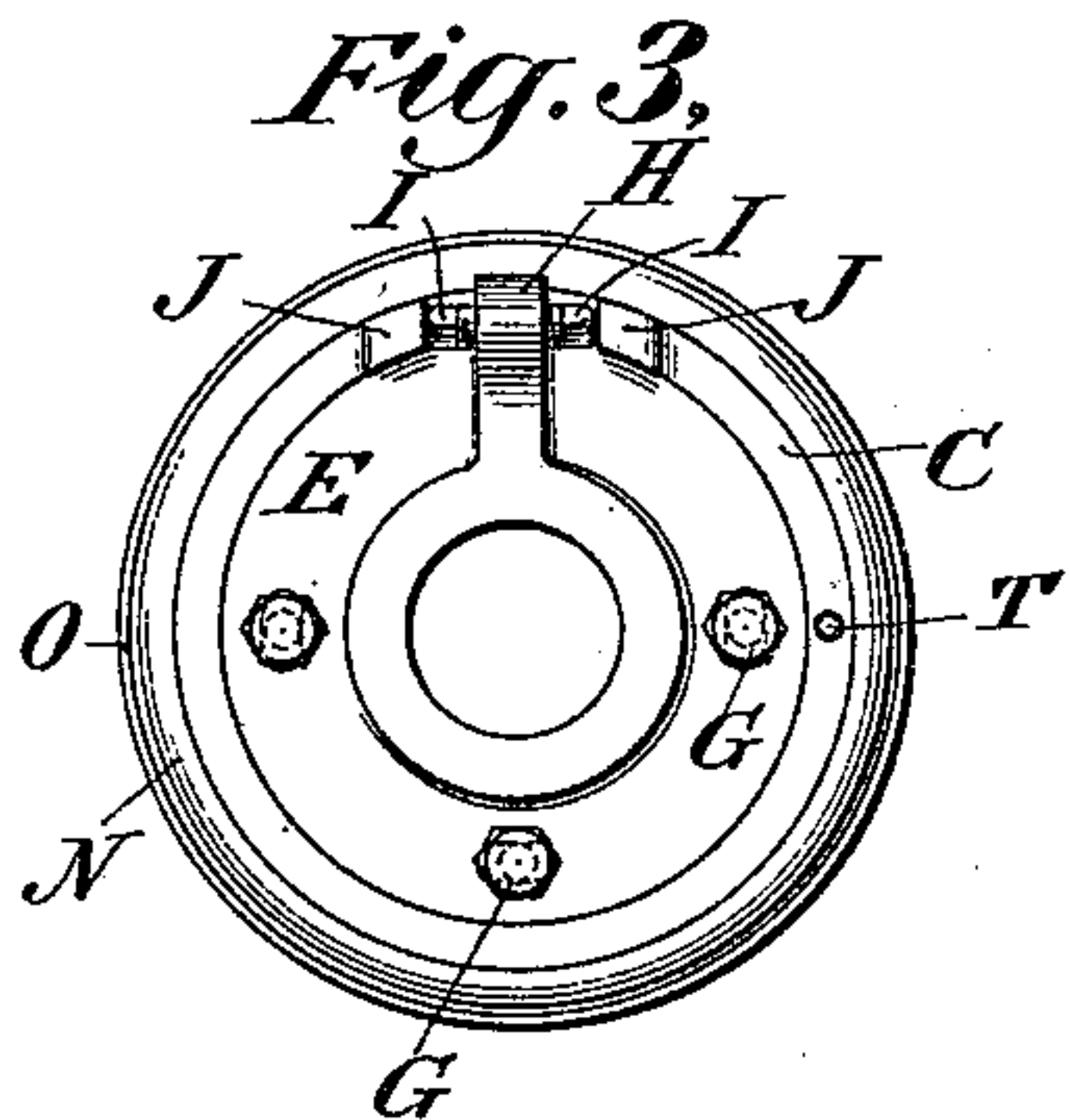
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FORM CYLINDER.

(Application filed Nov. 7, 1895. Renewed Jan. 20, 1899.)

(No Model.)

2 Sheets—Sheet 2.



Witnesses:-

D. R. Haybrook
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Inventor:

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UNITED STATES PATENT OFFICE.

EDWARD HETT, OF NEW YORK, N. Y.

FORM-CYLINDER.

SPECIFICATION forming part of Letters Patent No. 637,563, dated November 21, 1899.

Application filed November 7, 1895. Renewed January 20, 1899. Serial No. 702,845. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HETT, a citizen of the United States, and a resident of New York, (New Dorp,) in the county of Richmond and State of New York, have invented a new and useful Improvement in Printing-Forms and Printing Apparatus, of which the following is a full, clear, and exact description and specification, reference being had to the accompanying drawings, which form a part hereof.

My invention relates to hollow printing-forms that are removable from an interior supporting device and replaceable thereon, and especially to planographic-printing forms and to such as are rounded or to such as are tubular.

It has for its object to more accurately and reliably and conveniently adapt and combine the printing-form and supporting device to and with each other and both with the shaft.

It is an improvement upon the construction shown in my application for patent, Serial No. 537,582, filed February 7, 1895; and it consists of the mechanisms and devices herein set forth.

The accompanying drawings represent a cylindrical or tubular planographic-printing device embodying my improvements in the best form at present known to me.

Like letters of reference indicate like parts.

Figure 1 is a side view of the entire cylindrical printing device, lacking only the shaft, parts being broken away. Fig. 2 is a sectional view of the same, with the shaft, on the line $x x$ of Fig. 1. Figs. 3 and 5 are end views taken from opposite ends. Fig. 4 is a sectional view on the line 4 4 of Fig. 2, omitting the shaft. Fig. 6 is an end view with certain parts removed. Fig. 7 is a side view of one end of the device, omitting the shaft. Fig. 8 is a sectional view of the other end of the device, on the line 8 8 of Fig. 5, also omitting the shaft, one of the clamping devices being shown as loosened. Fig. 9 is a detail.

A is the supporting and driving shaft.

B is a collar or shoulder which is shrunk on the shaft or made integral therewith.

The form or supporting device or cylinder has a main cylindrical portion C, which is slightly tapered on its exterior from end to end. I have found that a taper of one-six-

teenth of an inch in a form-cylinder forty-three inches long and nine inches in diameter at its larger end is suitable, this making the smaller diameter eight and fifteen-sixteenths inches. The cylindrical portion C of the form-cylinder has two longitudinal grooves or slots D in its outer periphery to form a longitudinal sliding connection with the printing-tube.

E E are two end caps or collars or hubs or adjusting-supports keyed on the shaft A and carrying the cylindrical portion C of the form-cylinder. The latter has an inwardly-projecting ring F F at each end for the purposes of the attachment to these end hubs E. The rings F F are secured to the supporting-hubs E E by means of screw-bolts G. The cylindrical portion C of the form-cylinder is circumferentially adjustable on the supporting-hubs E E (and so on the shaft) in the following manner: The hubs E E each have a lug or projection H, which carries a screw-threaded adjusting-bolt I, adapted to take snugly between two shoulders or lugs J J on the cylindrical portion C of the form-cylinder. The bolt I is squared at each end, so that it can readily be turned, and is screw-threaded along the middle of its length, where it takes in an internal screw-thread in the lug H. Figs. 3, 5, and 7 show this construction. The screw-bolts G pass through slotted holes in the hubs E E, as shown in Figs. 3 and 5. To accomplish a readjustment of the cylindrical portion of the form-cylinder on the supporting-hubs, loosen the bolts G at both ends of the cylinder, screw the adjusting-bolts I in the direction and to the extent desired, keeping both ends of the form-cylinder in a uniform adjustment, so as to secure accuracy and prevent binding, and then tighten up all the screws G at both ends. The form-cylinder also has a central supporting and shaft-steadying collar or hub K, preferably made fast to or integral with the cylindrical portion C of the form-cylinder and a snug smooth-bore fit for the shaft. This supports the shaft at its central parts, preventing bowing of the long shaft under the great pressure employed, and it also supports and stiffens the cylindrical portion of the form-cylinder. The shaft A is of great length, carrying gear-wheels at its ends beyond the ends of the form-cylinder,

and the tendency to bend is considerable, although the form-cylinder does not ordinarily partake in such springing or bending. The cylindrical portion C of the form-cylinder has
 5 an adjustable stop or shoulder N at one end of it, the end of larger external diameter.

O is the hollow cylindrical printing surface or tube. It is internally tapered from end to end to correspond to the taper of the external
 10 surface of the form-cylinder, so that it may readily be slipped on and off of the form-cylinder and be a loose fit for the same until and unless it has reached approximately its
 15 proper seat on the same, when it is a snug and tight fit all along the length of the same. This taper is such as to give the printing-surface firm and solid support at every point from end to end when forced home to its seat. The printing-tube is non-tapering on its ex-
 20 terior surface and is in proper way prepared as a planographic surface and adapted to receive a design or transfer after the lithographic manner and to be thereafter developed into a printing-surface for that design. On its inner surface it has a lug or lugs P,
 25 which take in the grooves or slots D of the form-cylinder. In this way the printing-tube and the form-cylinder are connected by a spline. The printing-tube is slipped onto
 30 the form-cylinder, the lugs P traversing the slots D, and is forced home against the adjusting stop or collar N. In this forcing operation the form-cylinder, through one of the hubs E, takes against the collar or shoulder
 35 B on the shaft, whereby all endwise motion on the shaft is absolutely and reliably prevented. Two shoulders might be formed by enlarging the shaft in diameter between the hubs E E, correspondingly enlarging K. The
 40 printing-tube is held against the shoulder N by adjustable clamping-bolts Q, which screw into the form-cylinder and carry a projecting lip R, which projects over and engages with the printing-tube. The bolts Q are squared at
 45 the end, so as to be conveniently turned. Underneath a fixed shoulder they carry, loosely mounted upon a cylindrical part of the bolt, the hub carrying the projecting lip R. This
 50 hub is squared and adapted to take loosely into a square recess S in the end of the form-cylinder, beneath which is the threaded bore for the threaded part of the bolt Q. When the bolts Q are sufficiently unscrewed, the hub and lip R may be turned. In this way when it
 55 is desired to get the lip out of the way of the printing-tube so as to remove the tube the bolt is sufficiently unscrewed, the hub is turned ninety degrees and the bolt screwed down again. This keeps the lip reliably out of the
 60 way. Fig. 8 shows this in the case of one of the lips, the bolt not yet being screwed down, however. To secure the printing-tube in place, unscrew the bolt Q, turn the lip R until it projects over the end of the printing-tube, and then
 65 screw the bolt down again. To render the shoulder or stop N adjustable longitudinally of the form-cylinder, it is internally screw-

threaded and is carried on the end of the form-cylinder, which is externally screw-threaded for that purpose. To adjust it, turn it in its
 70 screw-thread as desired and then secure or lock it in its adjusted position in any practicable way, as by a pin driven into a hole suitably bored for the purpose. The clamps Q R are adjustable in the sense that they equally
 75 act as clamps whatever the adjustment of the shoulder or stop N, adjusting themselves in their clamping function and operation to the adjustment of that collar N.

To unseat the printing-tube from the form-cylinder and start it off when it is desired to
 80 remove it, I provide the screw-bolt T, which is suitably mounted in the form-cylinder so as not to move longitudinally therein when rotated, as by the two fixed collars shown in
 85 Fig. 2, and a traveling screw-threaded hub V, suitably held from rotating, but adapted to travel in a slot or groove in the form-cylinder on the bolt T when the bolt T is rotated and
 90 having a projecting lip or finger adapted to take against the printing-tube or some part of it, as shown in Fig. 2. This bolt T is squared at the end and may be conveniently turned by a handle with pawl-and-ratchet attachment, such as shown in Fig. 9.
 95

The present improvements have especial reference to multicolor-printing and to the attaining of accurate and related transfers upon a series of rounded or cylindrical printing-surfaces and the accurate and related and simultaneous printing from the series, so as to
 100 obtain perfect and reliable register in continuous multicolor-presswork. The circumferential adjustment of the form-cylinder, and so of the printing-tube, with respect to the
 105 shaft is important in securing the ultimate and finer adjustments in that direction that the most careful and accurate building of a machine cannot certainly and always obtain. The longitudinal adjustment (attained by the
 110 adjustable stop N) is important in accurately alining each printing-surface with all the other printing-surfaces of the series and in compensating for wear and for possible variations in special printing-tubes. The special
 115 clamping devices shown are well adapted to force the printing-tube well home to its seat against the stop N. The tapering of the printing-form and supporting device is of special
 120 value and importance in transferring after the lithographic manner and in planographic printing and in connection with the hollow planographic-printing forms of my invention, which require repeated handlings in use in
 125 the transfer-press and in the printing-press and absolutely accurate placing and holding and adjustment and firmly solid support from end to end while receiving a transfer or printing an impression. The form-removing device is efficient and compact and out of the
 130 way. It may be duplicated in one and the same form-cylinder, if desired.

Modifications may be made in many features of the general mechanism without de-

parting from my invention—as, for instance, transferring of the adjusting means from the one to the other of the two members that are being adjusted with respect to each other.

5 Thus the collar N might be made fixed and the abutting end of the printing-tube be made adjustable on the rest of the printing-tube. Again, the longitudinal slot D might be in the printing-tube, and the lug P in the form-cyl-
10 inder. Again, the unseating device T V might be mounted in the printing-tube and take against a part of the form-cylinder. Again, the printing-form and the supporting device need not be tubular or cylindrical in
15 cross-section, as they are shown to be in the drawings and as they are in the best form of the invention known to me; but they might be greatly varied in shape—as, for instance, they might be oval in cross-section, or, for the
20 purposes of some parts of the invention, polygonal or rectilinear; but these and similar changes that might be suggested are only variations of and not departures from the invention.

25 I prefer to make the hollow printing-form thin, to the end that it may be light and easy to handle. Its form or shape gives it a maximum of strength for a given weight of metal, and its combination with the removable form-
30 support, tapered from end to end to correspond to the internal taper of the printing-form itself, gives the requisite strength for printing and gives the uniformity of surface resistance in the transferring and printing
35 operation which is necessary to uniform lithographic transferring or printing. This uniformity of surface resistance is easy of attainment with massive and inflexible stones, but it is difficult of attainment with thin and
40 more or less flexible and springy lithographic-printing surfaces, such as zinc sheets. It is absolutely necessary, however, to successful transferring or printing in lithography. My improved combination in its preferred form
45 admirably attains that end.

For the purposes of some of the claims it is evident that the planographic surface of the printing-form when it shall have received its design or transfer after the lithographic man-
50 ner need not be developed into a printing-surface that is strictly planographic or lithographic.

What I claim as new, and desire to secure by Letters Patent, is—

55 1. The combination, substantially as described, of an interior supporting device, a hollow printing-form adapted to be seated upon it, and an unseating device to start the printing-form from the supporting device, the
60 unseating device including a revoluble screw-threaded bolt T, mounted in the supporting device, and a screw-threaded hub V traveling thereon in a slot in the supporting device and having a projecting finger taking against the
65 printing-form.

2. The combination with a hollow printing-

form and an interior supporting device having squared recess S and threaded hole, of an adjustable clamping device consisting of the threaded bolt Q having fixed collar, and of
70 the lip R and squared carrying-hub mounted loosely on the bolt Q, substantially as described.

3. The combination, substantially as described, of an interior supporting device, a
75 hollow printing-form, a longitudinal sliding connection between the two, an adjustable stop or shoulder to adjust the printing-form longitudinally on the supporting device, and a clamping device to hold it in such adjusted
80 position, a supporting and driving shaft, and a circumferentially-adjustable supporting connection between the supporting device and the shaft, whereby the printing-form may be adjusted both longitudinally and circumfer-
85 entially with respect to the shaft and will then be positively held and driven in its adjusted position.

4. The combination, substantially as described, of a shaft, a hollow supporting de-
90 vice adapted to be mounted upon the shaft, a hollow printing-form adapted to be mounted upon the supporting device, and adjustable connecting mechanism whereby the printing-form is adapted for longitudinal and
95 circumferential adjustment with respect to the shaft, the printing-form and supporting device being connected by a spline.

5. The combination, substantially as described, of a shaft, a hollow supporting de-
100 vice adapted to be mounted upon the shaft, a hollow printing-form adapted to be mounted upon the supporting device, and adjustable connecting mechanism whereby the printing-form is adapted for longitudinal and circum-
105 ferential adjustment with respect to the shaft, the printing-form and supporting device being connected by a spline, said connecting mechanism including an adjustable stop on the supporting device at one end, and means
110 for locking the printing-form against said stop.

6. The combination, substantially as described, of a shaft, an externally-tapered supporting device adapted to be mounted upon
115 the shaft and tapered from end to end, an internally-tapered hollow printing-form adapted to be mounted upon the supporting device and correspondingly tapered from end to end, a device for unseating the printing-form, and
120 adjustable connecting mechanism whereby the printing-form is adapted for longitudinal and circumferential adjustment on the shaft.

7. The combination, substantially as described, of a shaft, an externally-tapered sup-
125 porting device adapted to be mounted upon the shaft, an internally-tapered hollow printing-form adapted to be mounted upon the supporting device, a device for unseating the printing-form, the printing-form and sup-
130 porting device being connected by a spline, and adjustable connecting mechanism where-

by the printing-form is adapted for longitudinal and circumferential adjustment on the shaft.

8. The combination, substantially as described, of a shaft, an externally-tapered supporting device adapted to be mounted upon the shaft and tapered from end to end, an internally-tapered hollow printing-form adapted to be mounted upon the supporting device and correspondingly tapered from end to end, a device for unseating the printing-form, and adjustable connecting mechanism whereby the printing-form is adapted for longitudinal and circumferential adjustment on the shaft, said connecting mechanism including an adjusting-stop on the supporting device at one end and means for locking the printing-form against said stop.

9. The combination, substantially as described, of a shaft, an externally-tapered supporting device adapted to be mounted upon the shaft, an internally-tapered hollow printing-form adapted to be mounted upon the supporting device, a device for unseating the printing-form, the printing-form and supporting device being connected by a spline, and adjustable connecting mechanism whereby the printing-form is adapted for longitudinal and circumferential adjustment on the shaft, said connecting mechanism including an adjustable stop on the supporting device at one end, and means for locking the printing-form against said stop.

10. The combination, substantially as described, of an externally-tapered supporting device, an internally-tapered hollow printing-form, a longitudinal sliding connection between the two, an adjustable stop or shoulder to adjust the printing-form longitudinally on the supporting device and a clamping device to hold it in such adjusted position, a supporting and driving shaft, and a circumferentially-adjustable supporting connection between the supporting device and the shaft, whereby the printing-form may be adjusted both longitudinally and circumferentially with respect to the shaft and will then be positively held and driven in its adjusted position.

11. The combination, substantially as described, of a shaft, hubs carried thereby, a form-cylinder supported by and bolted to said hubs, devices whereby the form-cylinder may be circumferentially adjusted on the hubs, and a removable printing-tube adapted to be carried by the form-cylinder.

12. The combination, substantially as described, of a shaft, hubs carried thereby, an externally-tapered form-cylinder supported by and bolted to the hubs, devices whereby the form-cylinder may be circumferentially adjusted on the hubs, an internally-tapered printing tube or cylinder adapted to be carried by the form-cylinder, means for longitudinally adjusting and locking the printing-tube in place, and means for unseating the printing-tube.

13. The combination, substantially as de-

scribed, of a shaft, hubs carried thereby, a form-cylinder supported by and bolted to said hubs, devices whereby the form-cylinder may be circumferentially adjusted, a printing-tube adapted to be carried by the form-cylinder, a stop carried by one of the hubs for one end of the printing-tube, and adjustable means carried by the other hub for locking the printing-tube in place.

14. The combination, as set forth, of a suitable shaft or mandrel, a hollow rigid non-expandible form-support of substantial thickness carried on the shaft, the form-support having a tapering outer surface tapering from end to end, an exterior removable and replaceable hollow printing-form, the printing-form having a tapering inner surface adapted to fit the form-support and to that end correspondingly tapered from end to end, and an outer non-tapering printing-surface and guides by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

15. The combination, as set forth, of a suitable shaft or mandrel, a hollow rigid non-expandible form-support of substantial thickness carried on the shaft, the form-support having a tapering outer surface tapering from end to end, an exterior removable and replaceable hollow rounded printing-form, the printing-form having a tapering inner surface adapted to fit the form-support and to that end correspondingly tapered from end to end, and an outer non-tapering printing-surface and guides by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

16. The combination, as set forth, of a suitable shaft or mandrel, a hollow rigid non-expandible form-support of substantial thickness carried on the shaft, the form-support having a tapering outer surface tapering from end to end, an exterior removable and replaceable hollow rounded printing-form, the printing-form having a tapering inner surface adapted to fit the form-support and to that end correspondingly tapered from end to end, and an outer non-tapering printing-surface that is continuous or unbroken and guides by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

17. The combination with a form-support having a tapering outer surface tapering from end to end, of a removable and replaceable printing-form having a correspondingly-tapered inner surface, and guides by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

18. The combination with a form-support having a tapering outer surface tapering from end to end, of a removable and replaceable printing-form having a correspondingly-tapered inner surface and a circumferentially-continuous outer surface adapted to be de-

veloped into a lithographic-printing surface, and guides by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

5 19. The combination with a form-support having a tapering outer surface tapering from end to end, of a removable and replaceable printing-form having a correspondingly-tapered innersurface, and a circumferentially-
10 continuous outer surface adapted to be developed into a printing-surface, and guides

by means of which the position of the form upon the support may be fixed both circumferentially and longitudinally.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

EDWARD HETT.

Witnesses:

E. J. GRISWOLD,

D. HOWARD HAYWOOD.