No. 798,310. PATENTED AUG. 29, 1905.

J. H. WESSON.

SCREW MACHINE.

APPLICATION FILED AUG. 5, 1903.

6 SHEETS—SHEET 1.

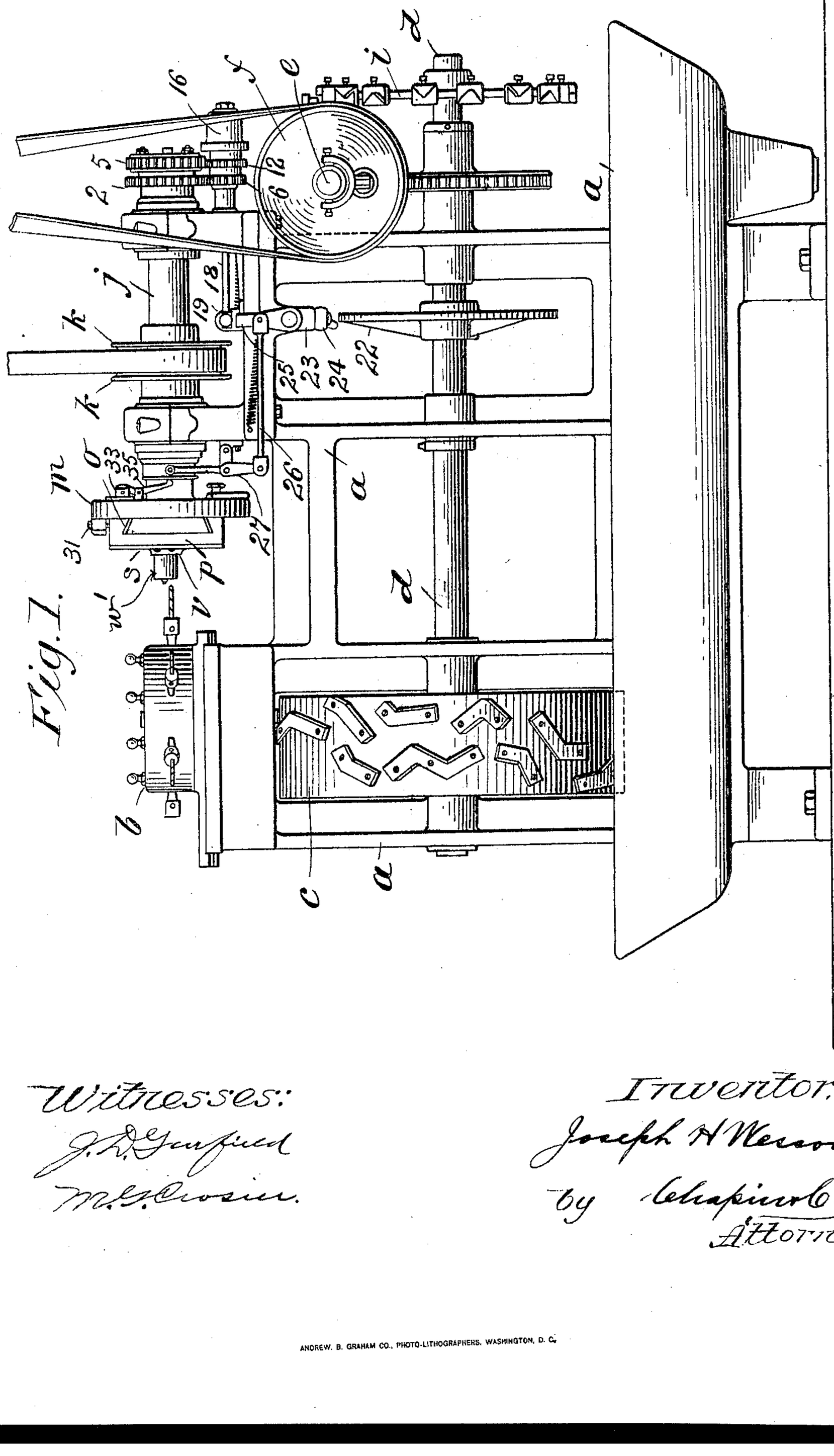

Fig. 1.

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6 SHEETS—SHEET 2.

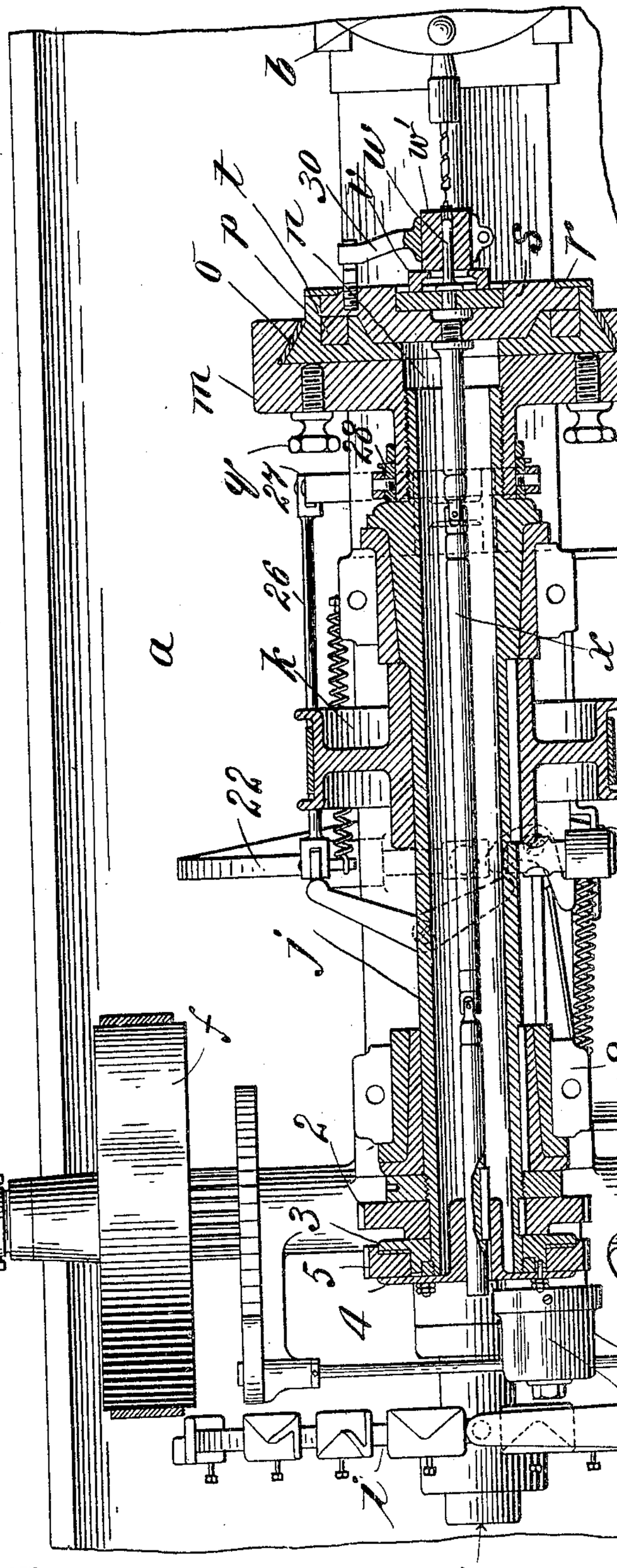

Fig. 2

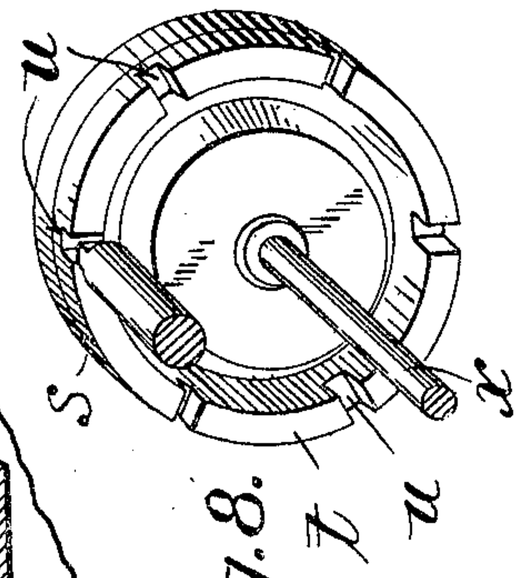

Fig. 8.

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6 SHEETS—SHEET 3.

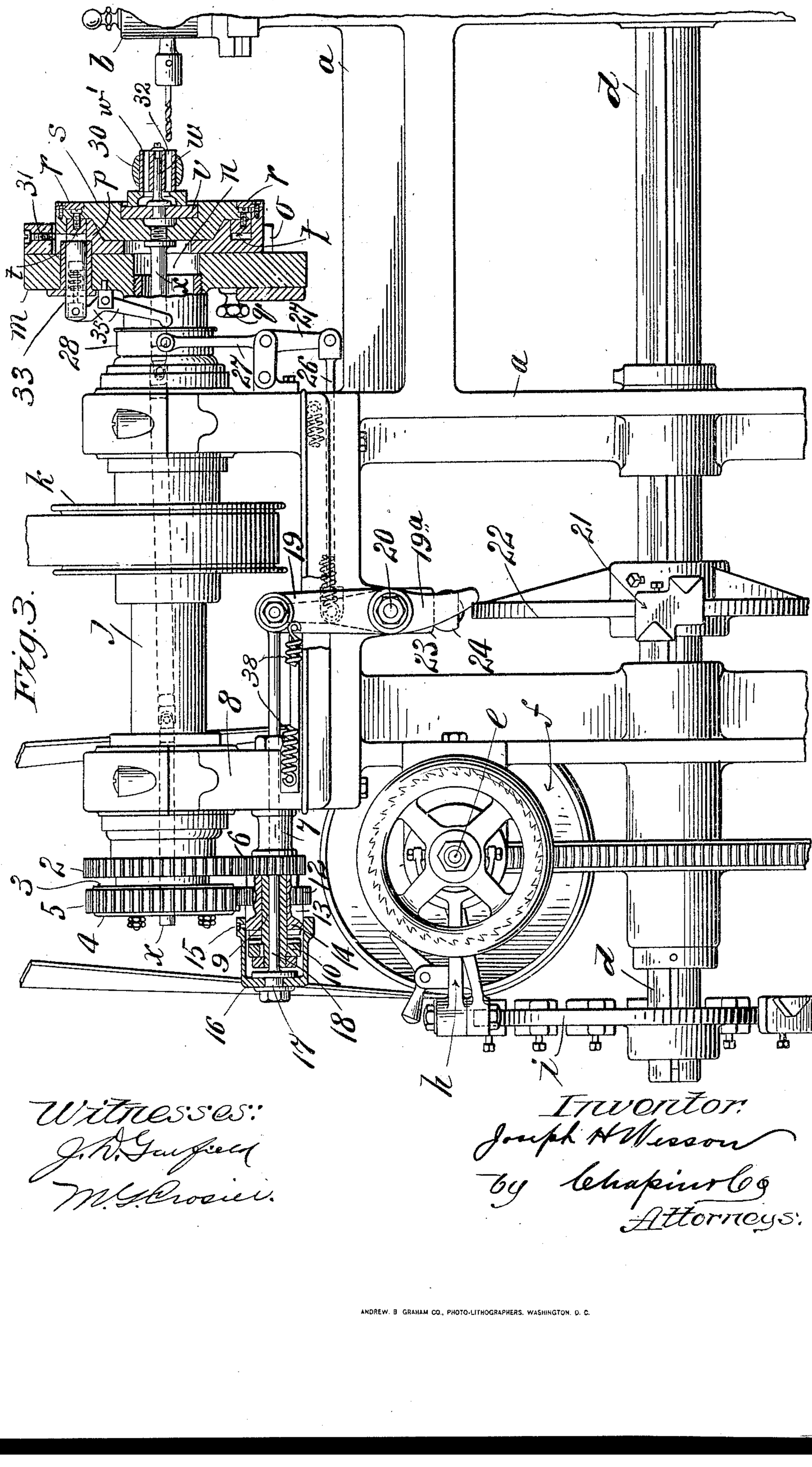

Fig. 3.

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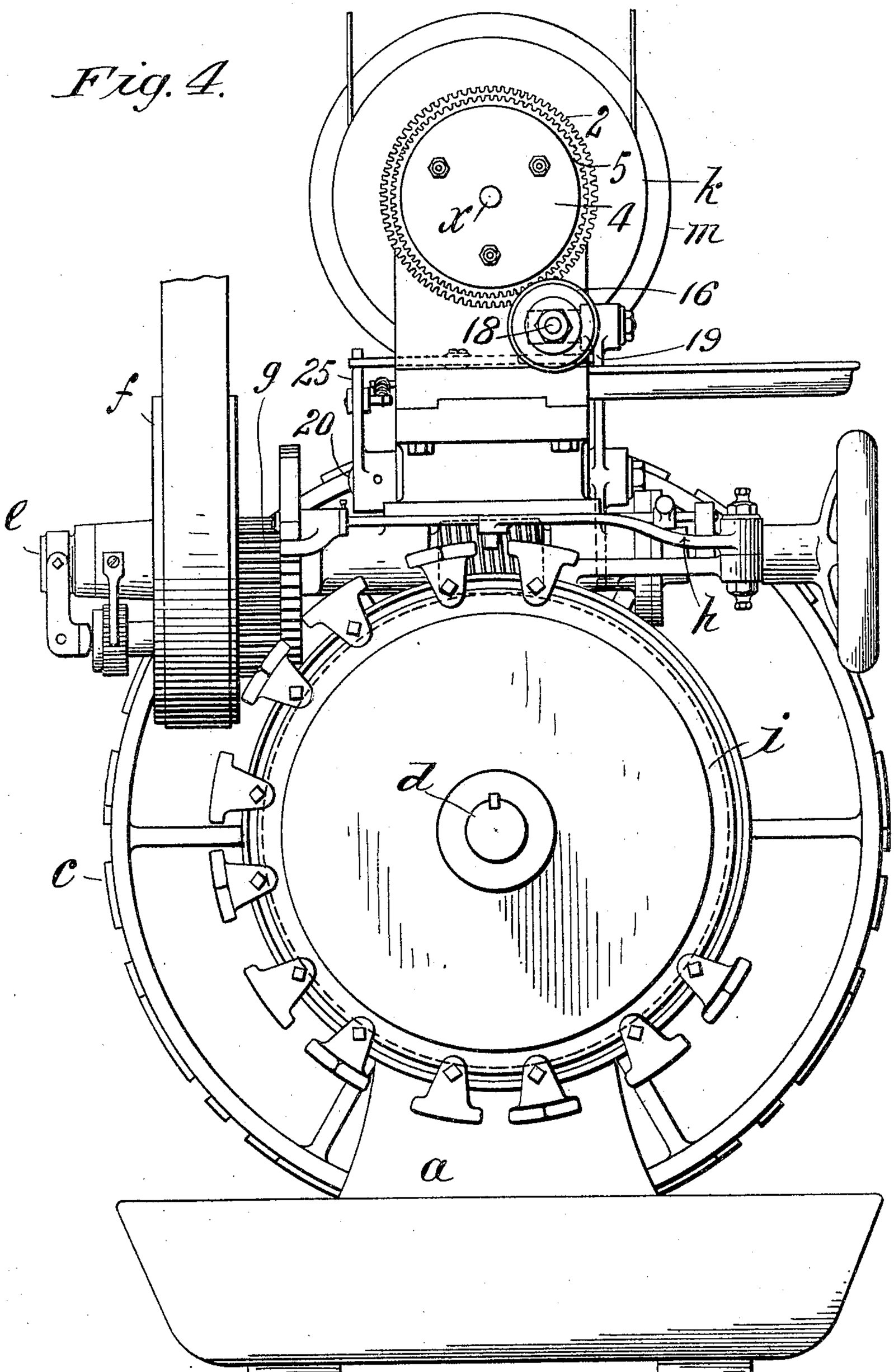
Fig. 4.



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6 SHEETS—SHEET 5.

Fig. 5.

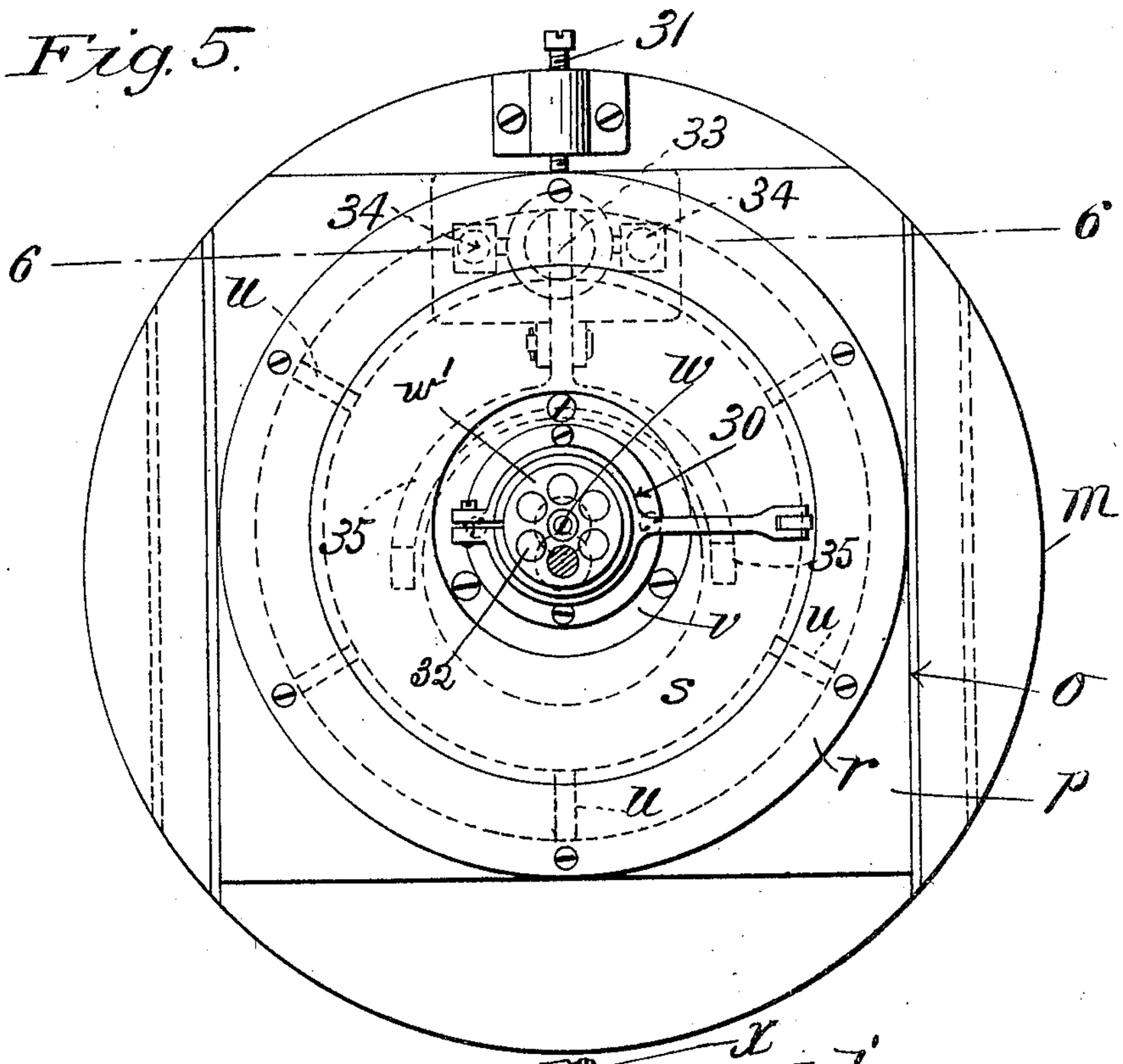
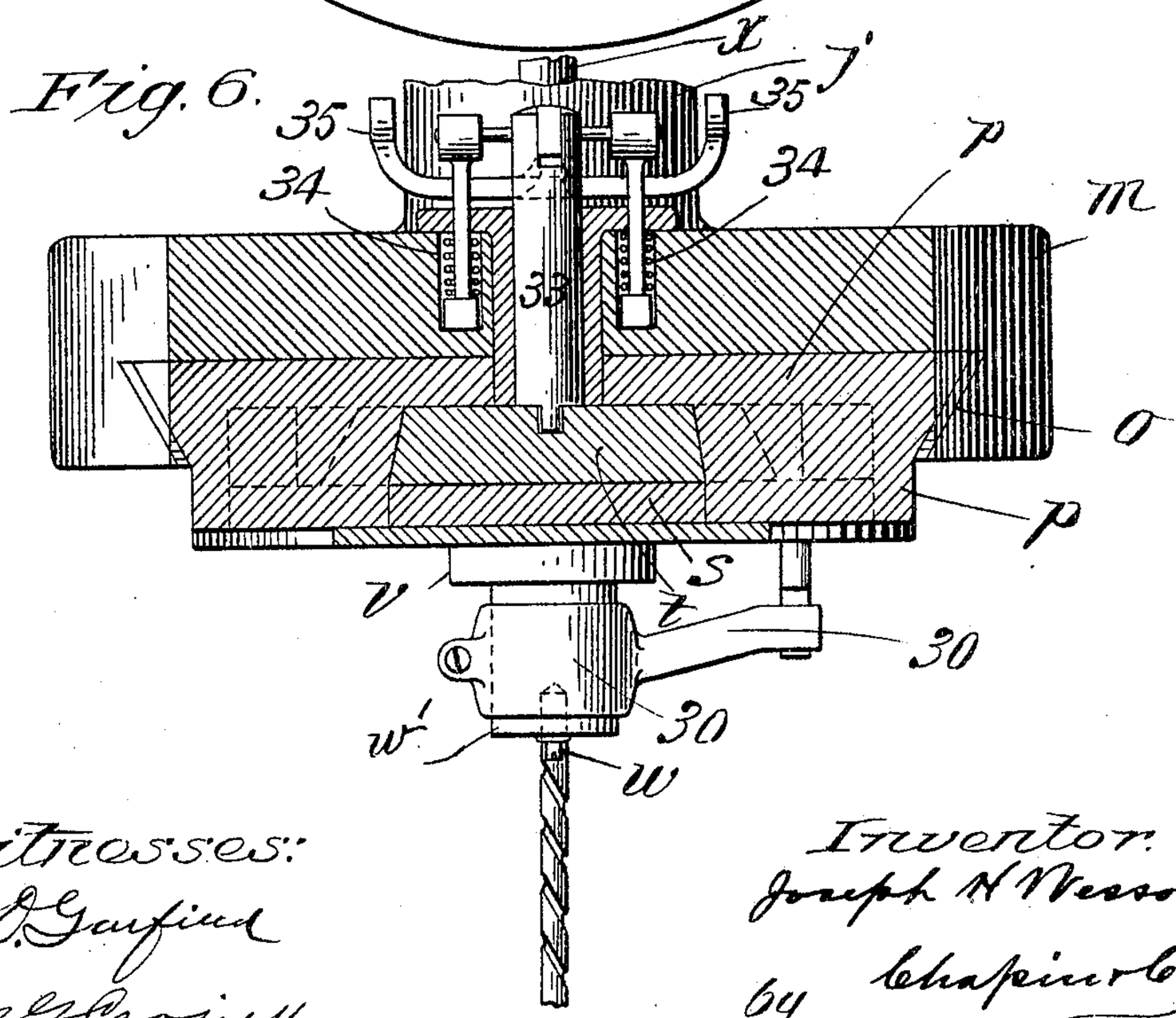


Fig. 6.



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SCREW MACHINE.

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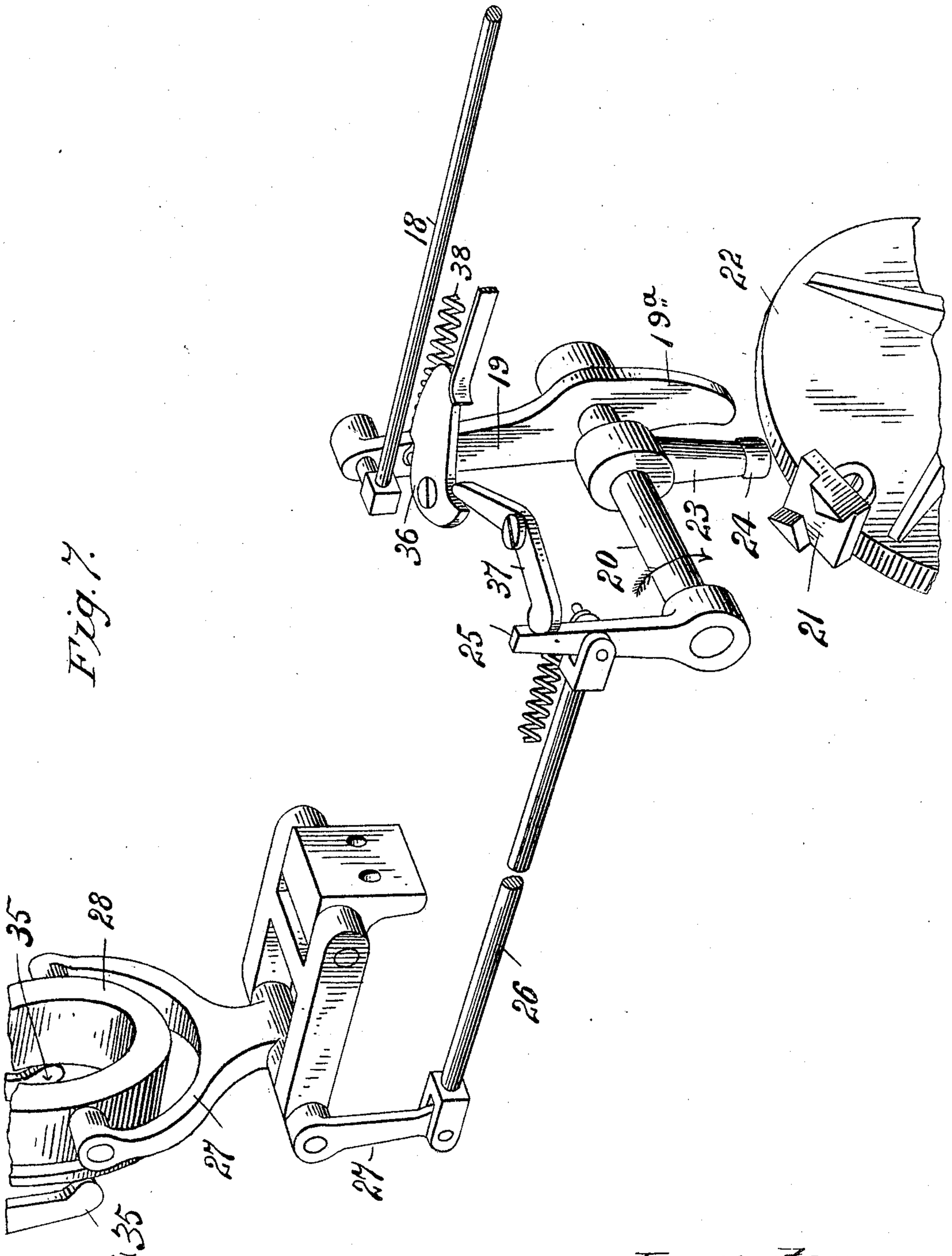
6 SHEETS—SHEET 6.

Fig. 7.



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UNITED STATES PATENT OFFICE.

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SCREW-MACHINE.

No. 798,310. Specification of Letters Patent. Patented Aug. 29, 1905.

Application filed August 5, 1903. Serial No. 168,269.

To all whom it may concern:

Be it known that I, JOSEPH H. WESSON, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Screw-Machines, of which the following is a specification.

This invention relates to that type of machines designated as "screw-machines;" and the object of the invention is to improve the chucking devices of machines of this type and the mechanism whereby said devices are operated, to the end that a piece of work may be held and rotated by the chuck proper in a position eccentric to the axis of the work and the latter then rotated independently on its own axis to present a new surface to the tool, each new surface thus presented being located in the axis of the chuck-spindle and the tool, these operations being performed without stopping the spindle on which the chuck is mounted.

Heretofore machines have been used to bore the chambers of revolver-cylinders, but not automatically; and this invention consists, essentially, in a construction embodying a chuck so mounted on the spindle of the screw-machine that it may be adjusted radially thereof to locate it eccentrically to the spindle and in the provision of means to automatically rotate the chuck on the spindle during the rotation of the latter to present another portion of the work to the tool, all as set forth in the following specification and carefully summarized in the claims.

In the drawings forming part of this application, Figure 1 is a side elevation of a machine embodying this invention. Fig. 2 is a plan view of that part of a machine to which the invention has been applied, a portion thereof being in section. Fig. 3 is a side elevation of the portion of the machine shown in plan in Fig. 2. Fig. 4 is an end elevation of Fig. 3 of the drawings looking to the right. Fig. 5 is an enlarged view of the face of the chuck. Fig. 6 is a plan view of the chuck, partly in section, the section being on line 6 6, Fig. 5. Fig. 7 is a perspective view of the mechanism for operating the chuck shown disassociated from the machine. Fig. 8 is a perspective view of a part of the chuck.

This invention particularly adapts the machine to which it is applied for the boring and counterboring of the chambers of revolver-cylinders, although it is adapted to any like work in which a series of concentrically-arranged holes are to be bored or bored and threaded, &c.

In the drawings, in which a common form of turret-lathe is shown with my invention applied thereto, the frame *a* has mounted on slideways, near one end thereof, a revoluble tool-holding turret *b*, which has the usual slow forward feed for advancing successively the various tools provided thereon and the accelerated return motion for retiring the said tools at the completion of their work, together with a partial rotation between each forward movement, whereby different tools are presented successively. These various operations are caused to occur at the proper predetermined intervals by the usual cam-wheel *c*, mounted on and near one end of a shaft *d*, which extends longitudinally of the machine. This shaft has near its other end a worm-and-gear engagement with a transversely-arranged driving-shaft *e*. The driving-pulley *f* thereon has a clutch engagement with the differential gears *g*, whereby the shaft *e* is alternately revolved very slowly by the gears *g* or at the faster speed of the pulley *f* by the engagement or disengagement of said gears, which in turn are effected by the operation of the clutch-lever *h* by the cam-wheel *i*, which is mounted on the shaft *d* and is revolved thereby, all of which is common construction in turret-lathes.

Mounted in bearings on the end of the frame *a* opposite to and in line with the center of the rotation of the turret *b* is the tubular spindle *j*, which is driven by the pulley *k*, which is keyed thereto. The work-holding or chucking end of this spindle *j* has firmly screwed thereon the chuck-body *m*, which is cylindrical in form and is provided with a central opening *n* of about the diameter of the spindle *j*. Extending across the face of the chuck-body *m* is a slideway *o*, (see Figs. 5 and 6,) in which a block *p* is held by the set-screws *q q*, the center of this block *p* being, as shown in Figs. 3 and 5, somewhat to one side of the center of rotation of the spindle *j*. Rotatably mounted on the face of this block *p* and held thereto by the retaining-ring *r* is the work-holding member *s* of the chuck. To insure a solid and accurately concentric bearing in the slidable block *p*, a cone-shaped central projection is formed on the rear face

of the member *s*, which fits closely in a corresponding depression in the block *p*. The member *s* has also provided on its rear face the annular rib *t*, which may be made an integral part thereof and is provided with the radial notches *u*. In a depression in the face of the member *s* is a circular plate or fixture *v*, secured thereto by screws, which has a pin *w* projecting therefrom on which the work to be operated on is centered. This plate *v* has a ground face on which the base of the work rests and which surface is accurately squared with the pin *w*. The particular class of work to which this chuck is designed, and as shown in the drawings, is the drilling, counterboring, &c., of cylinders of revolving firearms, the cylinder being indicated in the drawings by *w'*.

Fixed to the center of the member *s* and extending rearwardly therefrom is a shaft *x*, which consists as a whole of three sections with universal-joint connections, and by means of an arrangement of gears and operating devices therefor, to be now described in detail, the above-mentioned eccentrically-located member *s* of the chuck is given an intermittent rotation separate from that imparted to the chuck-body *m*, but simultaneously therewith, so that no loss of time such as would result if the spindle were stopped occurs.

On the rear end of the spindle *j* and keyed thereto is a gear 2, (see Fig. 3,) and loosely mounted on said spindle and held in frictional contact with the gear 2 by the friction-disks 3 and 4 is a gear 5, which has a less number of teeth than the gear 2. The function of the disks 3 and 4 will be described farther on. Meshing with this gear 2 is a smaller gear 6, which is supported on a stud 7 on the pillar-block 8, which constitutes one of the supports for the spindle *j*. This gear 6 has an extended sleeve 9, on which is secured the clutch member 10. Loosely mounted on this sleeve 9 is another small gear 12, which meshes with the friction-driven gear 5. This gear 12 has an extended hub 13, on which is formed a clutch member 14, adjacent and adapted to engage the clutch member 10.

Secured to the clutch member 14 at 15 is the cup-shaped extension or cap 16, loosely engaged at 17 by the sliding shaft 18, which passes through the stud 7 and pillar-block 8 and is pivotally attached to the upper end of a lever 19, as clearly shown in Figs. 3 and 7. This lever 19 is loosely supported on one end of a rock-shaft 20, which extends across the bed of the lathe under the spindle *j* and at right angles thereto. The downwardly-extending portion 19ª of this lever 19 is in the path of rotation of a cam-dog 21, which is adjustably mounted on the wheel 22. (See Figs. 1, 3, and 7.) A downwardly-extending lever 23 is fixed on the shaft 20 and has a cam-roller 24 on its lower end, which is also in the path of rotation of the cam-dog 21. At the other end of the shaft 20 from that on which the lever 19 is mounted is an upstanding arm 25, from which extends a connecting-rod 26 to a down-hanging arm connected to and forming part of the swiveled or forked lever 27. (See Figs. 1, 3, and 7.) This lever 27 is pivotally attached to the sliding collar 28 on the spindle *j*.

Referring to the gear 5, which has been described as frictionally connected to the flexible driving-shaft *x*, the purpose of so connecting said gear and driving-shaft is that it is almost impossible to so correctly time the engagement or disengagement of the pin 33 with the chuck and the simultaneous clutching and unclutching of the members 10 and 14, whereby the gear 5 is rotated, that it has been found necessary to provide means to let the gears slip more or less in order that no teeth may be stripped out of it, as would otherwise be the case if the parts were rigidly united.

Having now described and designated by reference letters or numerals the mechanism embodied in this invention, the operation of the chuck in practice is as follows: A cylinder for a revolver, having a centrally-drilled hole through it, is placed on the pin *w* of the plate *v* and is securely held thereon against rotation, independent of that of the chuck proper, by the clamp 30, which is attached by one end to the member *s* of the chuck, the block *p*, on which said member *s* is mounted, having been moved in its slideway *o* a sufficient distance to or from the center of rotation of the chuck-body *m*. This adjustment may be accurately determined by the stop-screw 31 on the chuck-body *m*, and it determines the distance of chambers in the cylinders from the axis of the latter. The jointed shaft *x*, which is attached to the member *s*, will be thereby moved out of alinement with the spindle *j*, and the degree of endwise movement caused thereby is compensated for by the sliding connection of the shaft in the hub of the frictional disk 4 of the gear 5, which rotates the shaft *x* through the said frictional disk 4. It is clear, then, that the cylinder being offset relative to the axis of the spindle *j* it will rotate on the axis of one of its chambers, and the partial rotation of the cylinder on its own axis will properly locate the various points in its end at which the various chambers are to be formed. It being now assumed that the above-referred-to revolver-cylinder has been adjusted in the clutch to a position where a drill held in the turret *b* is in a line with the center of rotation of the spindle *j* and that by the rotation by the spindle one of the cartridge-chambers 32 has been drilled in the cylinder, the rotation of the cylinder on its own axis is effected as follows: The cam-dog 21 on the wheel 22 (see Fig. 7) at the moment of the retirement of the drill from the revolver-cylinder, as described, is adjusted to engage the roller 24 on the lever 23, and there-

by rock the shaft 20 in the direction of the arrow shown in Fig. 7, thereby swinging the lever 25, and, through the connecting-rod 26, also swinging the lever 27 and through this lever sliding the collar 28 on the spindle *j*, thus drawing the locking-pin 33 out of one of the notches *u* in the annular rib *t* against the springs 34. The same rocking of the shaft 20 which effects the withdrawal of the locking-pin 33 simultaneously moves the catch-plate 36 through the swinging of the pivoted lever 37 by the arm 25 and releases the lever 19, which has been held thereby against the pull of the spring 38, and by the action of said spring the lever 19 is drawn back and slides the shaft 18, which is attached thereto, and through the connection of said shaft 18 with the clutch member 14, before described and illustrated in Fig. 3, causes the gears 12 and 6 to rotate as one, and thus drive the gear 5, which is frictionally attached to the shaft *x*, at a greater speed than that at which the gear 2 (which is mounted on the spindle *j*) is rotated, and through the connections of the member *s* of the chuck with the gear 5 through the jointed shaft *x* the member *s*, together with the revolver-cylinder held thereon, is given a rotation in excess of that of the main chuck-body *m*. Immediately following the release of the lever 19, through which, as just described, the member *s* is given its accelerated rotation, a further advance of the cam-dog 21 brings it into engagement with the lower portion 19ª of the lever 19 and swings said lever back to the position shown in Figs. 7 and 3, at which time the locking-pin 33 engages the next notch *u* of the member *s* of the chuck through the action of the above-mentioned springs 34. (See Figs. 5 and 6.)

It is apparent from the foregoing description of the machine that the chuck may be adjusted to adapt the machine to bore the holes at any distance from a common center and the cam-dogs on the cam-wheel 22 may be set to release the chuck at any desired point and simultaneously to effect the rotation of the gear 5 relative to the spindle to rotate the chuck. By changing, therefore, the relative proportions of the gears 2 and 6 or of the gears 5 and 12 speed of rotation of the chuck may be varied or the degree of its rotation may be changed by a change in the relative position of the shipping and unshipping cams mounted on the cam-wheel 22, whereby the clutch elements 10 and 14 are operated.

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

1. A screw-machine or the like comprising a spindle, a chuck eccentrically mounted on the spindle and independently rotatable relative to the latter, separate driving mechanism for the chuck and the spindle, and means of connection between the chuck and the spindle to effect their simultaneous rotation.

2. A screw-machine or the like comprising a hollow spindle, a rotatable chuck eccentrically mounted on the spindle, means to rotate the chuck and spindle as one, and devices extending through the spindle and connected with the chuck to rotate the latter, independently of the spindle.

3. A hollow spindle, a chuck independently rotatable relative thereto, mounted on the end of the spindle; means to adjust the chuck transversely of the axis of the spindle; a flexible driving connection axially connected with the chuck and extending toward the opposite end of the spindle, and suitable means operated by the movement of the machine and connected with said flexible driving connection, whereby the chuck may be rotated independently of the rotation of the spindle.

4. A hollow spindle, a chuck independently rotatable relative thereto mounted on the end of the spindle; means to adjust the chuck transversely of the axis of the spindle, and differential gears mounted upon the opposite end of the spindle, one tight and one loose thereon; a flexible driving connection axially connected with the chuck at one end and with said loose gear at its opposite end, a countershaft, and gears on the latter to engage the gears on the spindle to rotate the chuck and spindle independently.

5. The combination with a hollow spindle of a screw-machine or the like, of a chuck on the spindle independently rotatable relative thereto, means to adjust the chuck radially of the spindle, separate driving mechanism for the chuck and the spindle, whereby they may be independently rotated at different rates of speed, together with suitable means of connection between the chuck and the spindle to effect their simultaneous rotation.

6. The combination with a hollow spindle of a screw-machine or the like, and means to rotate the same, of a chuck mounted on one end thereof transversely adjustable relative to the axis of the spindle, said chuck and spindle being independently rotatable; a flexible driving connection for the chuck extending through the spindle, and means to automatically rotate the spindle and chuck at different rates of speed.

7. A screw-machine or the like comprising a spindle, an independently-rotatable chuck mounted eccentrically thereon, an independent driving connection for the chuck, means to lock the chuck to the spindle, together with mechanism connected with the spindle, actuated by the movements of the machine, to successively actuate the chuck-locking and the chuck-rotating devices.

8. A screw-machine or the like comprising a hollow spindle, a rotatable chuck mounted on the spindle, and means to adjust the chuck transversely of the axis of the latter, said chuck and spindle being independently rotatable; a driving connection extending through

the spindle to rotate the chuck independently of the spindle, and a driving-gear yieldingly secured on said chuck-driving connection.

9. In a screw-machine or the like, a spindle, a chuck mounted thereon independently rotatable relative thereto; a locking-pin to stop the chuck in a certain position; driving means to rotate the chuck, and a yielding connection incorporated in said driving means.

10. A continuously-rotating spindle, a chuck eccentrically mounted thereon and independently rotatable relative thereto, and suitable mechanism connected with the spindle and actuated by the movements of the machine to intermittently rotate the chuck at a different rate of speed to that of the spindle.

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