No. 693,407. Patented Feb. 18, 1902.

C. S. LABOFISH.

REVERSING MECHANISM.

(Application filed July 9, 1897.)

(No Model.) 2 Sheets—Sheet 1.

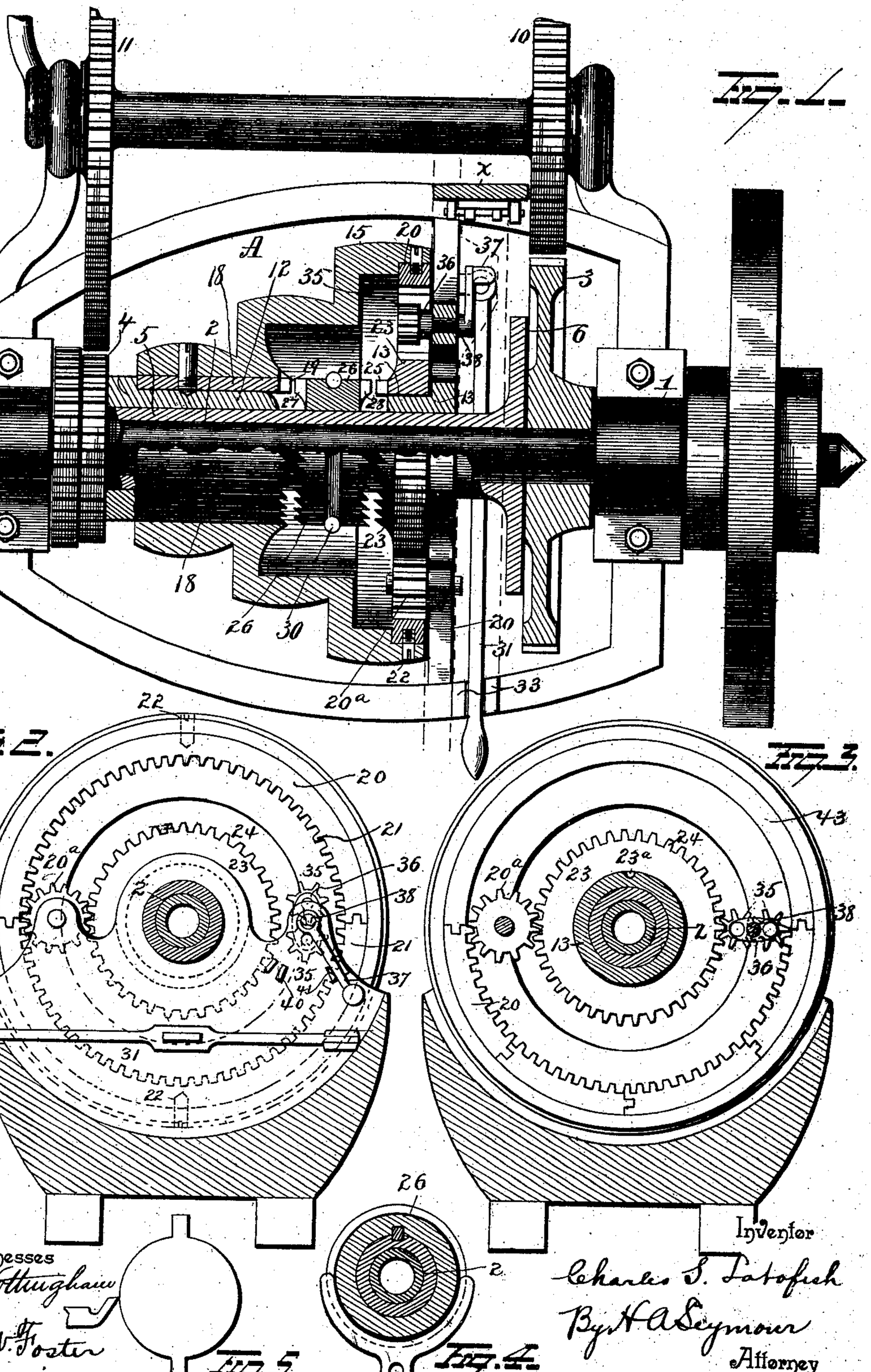

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 5.

Fig. 4.

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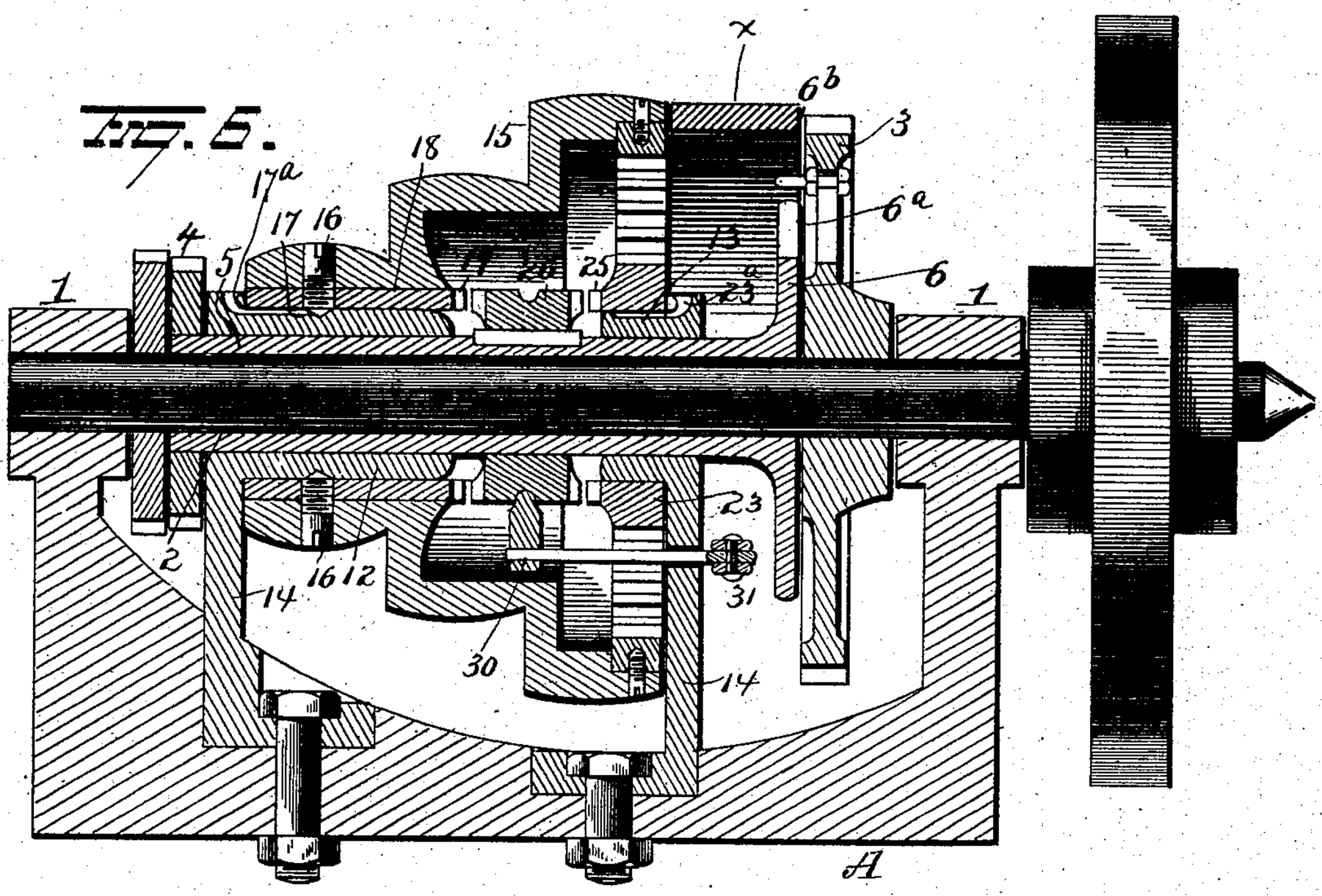
Fig. 6.



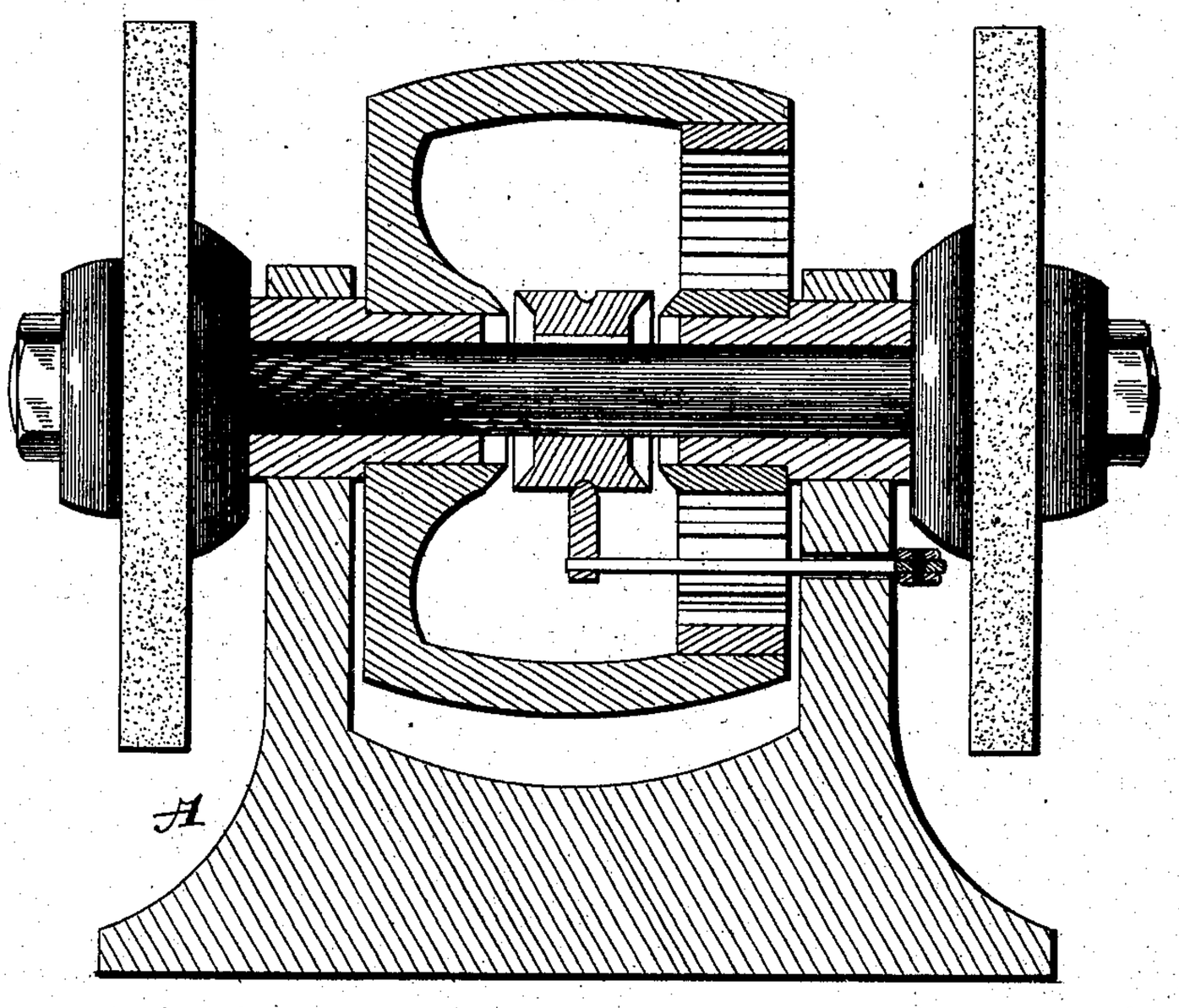


Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES S. LABOFISH, OF WASHINGTON, DISTRICT OF COLUMBIA.

REVERSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 693,407, dated February 18, 1902.

Application filed July 9, 1897. Serial No. 644,026. (No model.)

To all whom it may concern:

Be it known that I, CHARLES S. LABOFISH, a resident of Washington, in the District of Columbia, have invented certain new and useful Improvements in Reversing Mechanism; 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 an improvement in reversing mechanism applicable to lathes and similar machinery, the object being to provide means within convenient reach of the operator for reversing the driven spindle of the machine.

A further object is to so construct and arrange reversing mechanism that it shall be located directly upon and form a part of the machine and without unduly encumbering the machine, thus dispensing with undesirable and dangerous overhead belting and belt-shifters.

With these objects in view the invention consists in certain novel features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view, partly in horizontal section. Fig. 2 is a transverse vertical sectional view on the line *y y* of Fig. 1. Fig. 3 is a transverse sectional view on the line *z z* of Fig. 1. Figs. 4 and 5 are detail views, and Fig. 6 is a longitudinal section. Fig. 7 is a view of a modification.

A represents the head-stock of a machine. Revolubly supported in suitable bearings 1 1 on the head-stock is the live-spindle 2. A large gear-wheel 3 is secured to the spindle 2. A sleeve 5 is mounted loosely on the shaft or spindle 2 and provided at one end with a flange or disk 6, having a slot 6^a for the reception of a pin 6^b, whereby to connect flange or disk 6 with the gear-wheel 3. A small gear-wheel 4 is secured on the opposite end of the sleeve 5 from the disk or flange. Gear-wheels 10 and 11 are mounted adjustably in suitable bearings and are adapted to be made to mesh with the respective gear-wheels 3 and 4. By means of the differential gear-wheels 10 and 11 and the pin 6^b the speed of the machine can be reduced. The sleeve 5 turns in a pair of bosses 12 and 13, which project inwardly from the upper ends of standards 14 14, secured to the head-stock. A cone-pulley 15 is journaled on boss 12 and prevented from endwise movement by means of pins 16 16, which extend from opposite points into a circumferential groove 17 in the boss 12. To supply the groove and pins with lubricant, oil-ducts 17^a are provided. Shrunk or otherwise secured in the bore of the cone-pulley, with the pins 16 16 passing through it, is the cylinder 18, preferably having ratchet-shaped teeth 19 cut on its inner end. An internally-toothed gear 20 (composed of segments 21 21) is secured in the larger end of the pulley, as shown, by means of screws 22 22 or otherwise.

On the boss 13 a gear-wheel 23 is journaled with its teeth 24 opposite the teeth 21 of the internal gear 20, from which latter motion is communicated to it from pulley 15 through an intermediate pinion 20^a. To lubricate the bearing of gear 23, an oil-duct 23^a may be provided in the boss 13. By mounting the loose pulley 15 and the gear-wheel 23 upon the bosses 12 13 and passing the shaft or spindle through said bosses there will be no tendency of the shaft to rotate in one direction or the other by frictional contact, so that said shaft will be rotated only when it is connected with the pulley by the devices herein described. On its inner end the gear-wheel 23 is provided with teeth 25, (preferably ratchet-shaped,) which incline in the opposite direction from teeth 19 on cylinder 18 in the pulley. Interposed between these two sets of ratchet-shaped teeth 19 and 25 is a sleeve 26, which is keyed to slide on sleeve 5, with which it turns, or on the spindle when no differential gears are used. The sleeve 26 has teeth 27 28 on its opposite ends corresponding in pitch and number with teeth 19 and 25 of the cone-pulley 15 and gear-wheel 23, respectively.

A spanner 30 is arranged to slide the sleeve 26 to clutch in the pulley 15 or gear-wheel 25, as the case may be, to cause a forward movement or a reversal of the spindle 2, or it may be shifted to the intermediate position shown to stop the spindle. This spanner is operated by a hand-lever 31 within convenient

reach of the operator, so that without interfering in the slightest degree with the progress of his work he can place one hand on this lever 31 and move it to the right or left to reverse or stop the rotation of the spindle. Heretofore it has generally been the practice to employ a main shaft and a counter-shaft and to equip them with a straight and cross belt and clutch for clutching in the pulley over which the straight or crossed belt passed, accordingly as the spindle was to be driven forward or reversed. This clutch was operated by means of a long lever reaching usually from the ceiling or, at any rate, of such construction and arrangement that the entire attention of the operator was required to be centered upon it every time it was manipulated, to the loss of much time, not to mention the inconvenience and awkwardness arising from shifting belts or pulleys attendant upon its manipulation. This objection is obviated completely in the present invention. The use of all belting except the driving-belt is dispensed with and the reversing mechanism is made a part of the machine itself. These are important features of my invention. A toothed segment 33 is furnished for locking the hand-lever 31 against accidental displacement in any one of the three positions mentioned.

To prevent the ingress of dust and chips between the disk and the pulley, a yoke or band *x* is hinged at the rear of the head-stock.

Of course it is understood that the differential or change speed mechanism is operated just as in other lathes or kindred machinery, and where no differential gears are used the sleeve 5 may be dispensed with.

It is frequently desirable to automatically reverse the spindle at each half-revolution—as, for instance, when turning a piece of metal of the general form shown in Fig. 5. In this event a pair of meshing intermediate pinions 35 35 are used. These pinions 35 35 are mounted on plate 36, and they are of a size when in the position shown in Fig. 3 to reach across the space between gear-teeth 20 and 23 and mesh with each other. A hand-crank 37 is secured to the central axis 38, on which this plate 36 is turned, and toothed segments 40 and 41 are provided for locking the crank in either of the positions shown in Fig. 2 or Fig. 3. The normal position is that indicated in Fig. 2. Then it is that the motion is a continuous rotary motion unless reversed by hand by the lever 31. When it is desired to reverse the motion automatically at each fraction of a revolution, one of the toothed sections 21 of internally-toothed gear 20 is removed, and in its stead one plain section 43 is substituted therefor, and the crank 37 is shifted to the other segment 41, thus throwing the pinions 35 35 into position to engage the teeth at either side. When in this adjustment it will be observed that during one-half of the revolution of the cone-pulley 15 its teeth are in engagement with the teeth of pinion 20^a and pinion 20^a drives pinion 23 in one direction. When pinion 20^a reaches the end of teeth 20 one of the small pinions 35 is reached by the teeth 20, and there being two of these in place of the one pinion 20^a the motion is reversed.

In the form of the invention shown in Fig. 7 the standards 14 are omitted and the bearings of the head-stock extended inwardly to form journals for the driven pulley and reversing-gearing to be connected therewith.

It need hardly be mentioned that such slight variations may be made as will fall within the scope of the invention, and hence I do not wish to be limited to the exact constructions herein described; but,

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

1. The combination with the spindle of a lathe or similar machine, a driven pulley and gear-wheel journaled concentrically with said spindle, said pulley having a mutilated internal gear, and devices operatively connected with the gear-wheel to convert the continuous rotary motion of the pulley into reciprocating rotary motion of the spindle.

2. A lathe or similar machine comprising a head-stock, and a spindle journaled therein, standards disposed in the head-stock and constructed to revolubly support a driven pulley and a gear-wheel.

3. A machine comprising a revoluble spindle journaled in its head-stock, said head-stock provided with projecting bosses, a driven pulley and gear-wheel journaled on said bosses and clutch mechanism arranged between said pulley and gear-wheel.

4. The combination with a spindle, of a pulley concentric therewith having removable internal tooth-sections, a gear concentric with the spindle, a single pinion permanently interposed between the gear and tooth-section and a pair of intermediate pinions adapted to be thrown into or out of mesh with the teeth of the gear and tooth-section whereby, when in engagement with these teeth to automatically reverse the spindle with each half-revolution.

5. The combination with the head-stock of a lathe having a spindle journaled therein and a loose sleeve having a disk on one end and a gear-wheel on its opposite end and a loose pulley having a bearing concentric with the sleeve, a differential gear, the disk or flange being adapted to be coupled on a gear-wheel fixed upon the spindle to become part thereof and the gear when the disk is uncoupled to mesh with the differential gear journaled in arms projecting from the head-stock.

6. The combination of a lathe or similar machine having a spindle journaled in its head-stock and a driven loose pulley, an internal gear, clutching devices, a loose gear-wheel having clutching devices on one side of its hub, intermediate gear-wheels between

said loose gear-wheel and the internal gear, a standard erected in close proximity to the free opening of the pulley for supporting the intermediate gear-wheels and a gear-wheel upon the spindle.

7. The combination with the head-stock of a lathe or similar machine, of two standards mounted thereon and having oppositely-disposed hollow bosses at their free ends, a shaft passing through said bosses, a loose pulley mounted on the boss of one standard, a gear mounted on the boss of the other standard, a clutch between said pulley and gear and means for transmitting motion to said shaft, substantially as set forth.

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

CHARLES S. LABOFISH.

Witnesses:
C. S. DRURY,
J. B. NICHOLSON.