

No. 797,189.

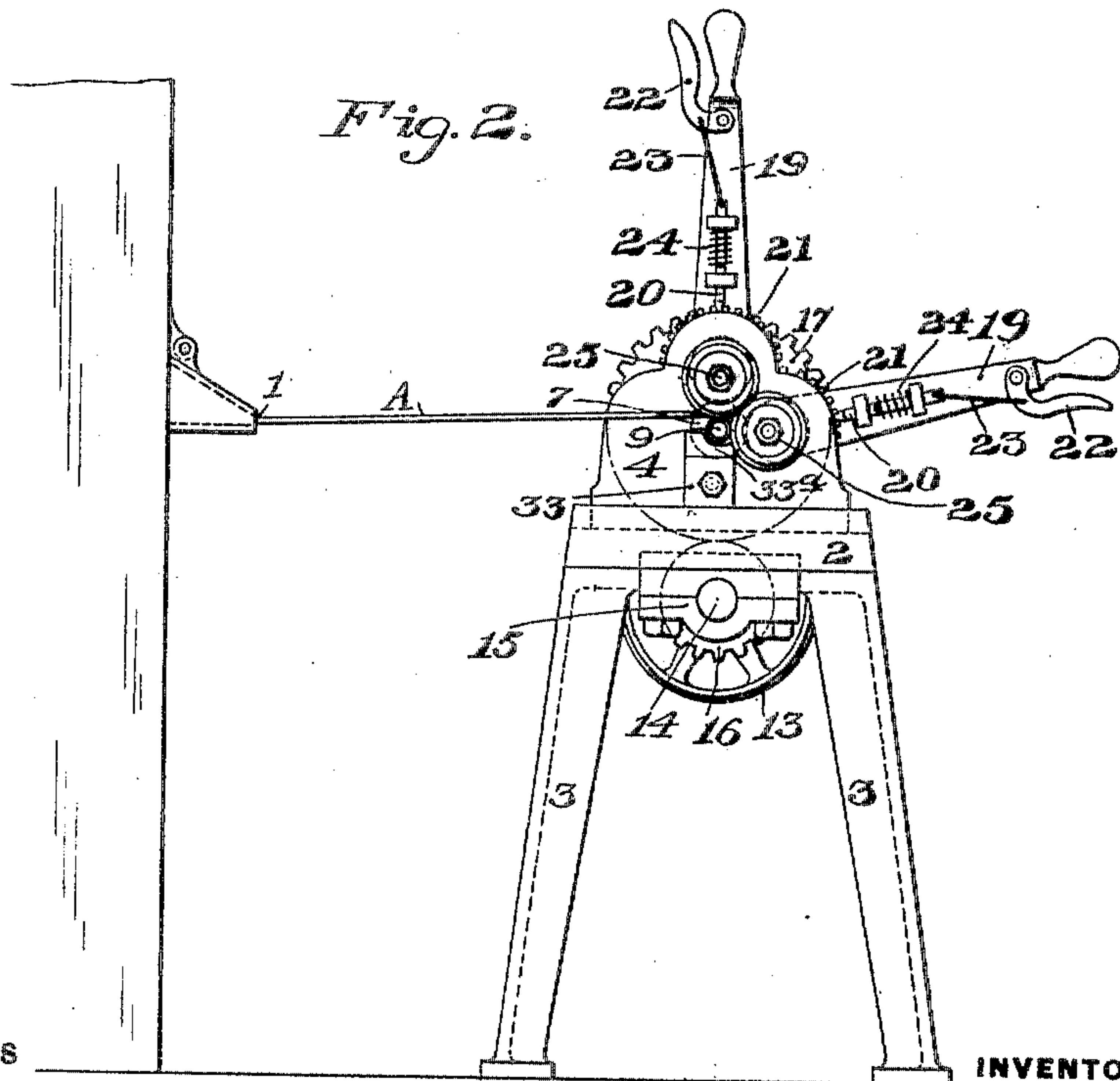
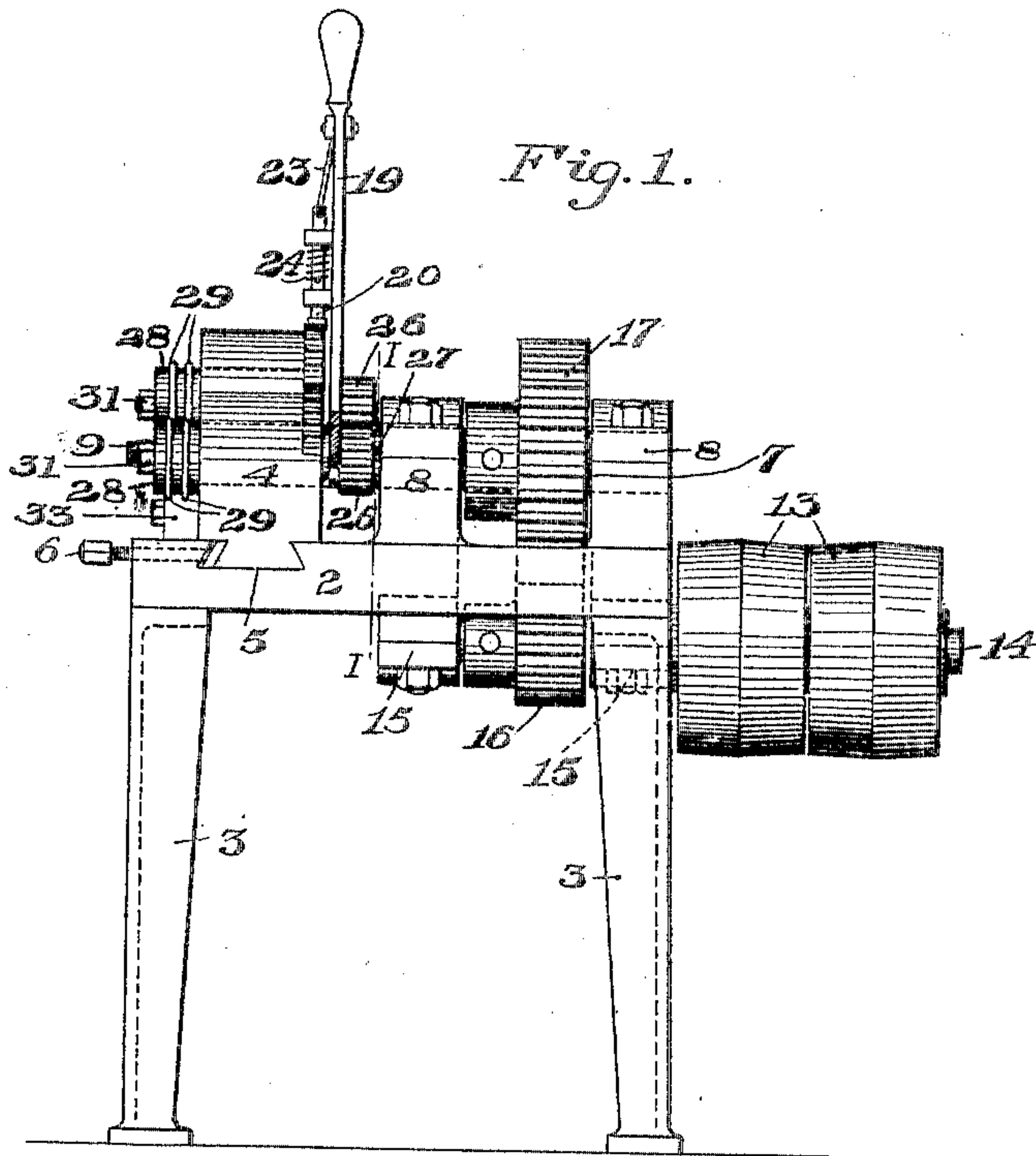
PATENTED AUG. 15, 1905.

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APPARATUS FOR THE MANUFACTURE OF HELICAL FORMS.

APPLICATION FILED MAR. 13, 1905.

2 SHEETS—SHEET 1.



WITNESSES

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2 SHEETS—SHEET 2

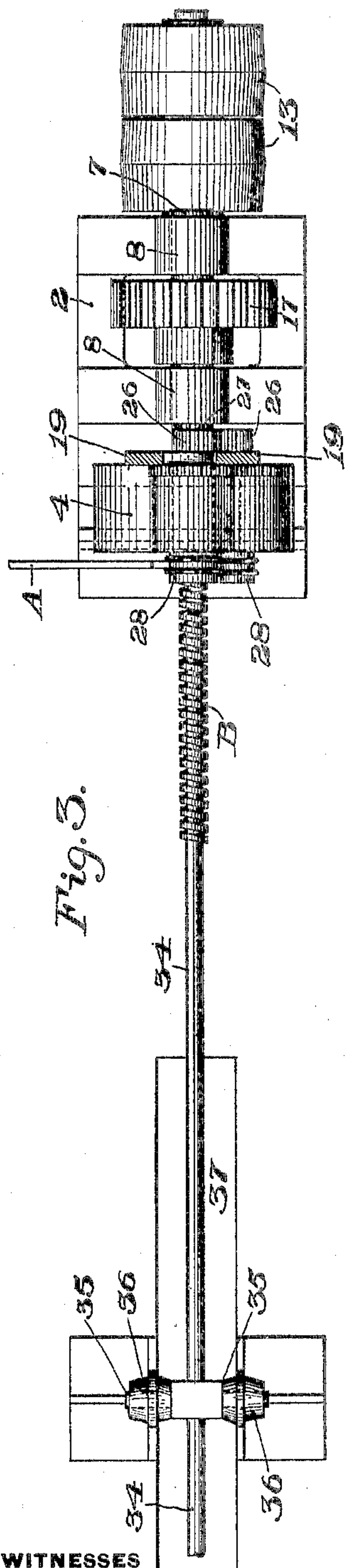


Fig. 3.

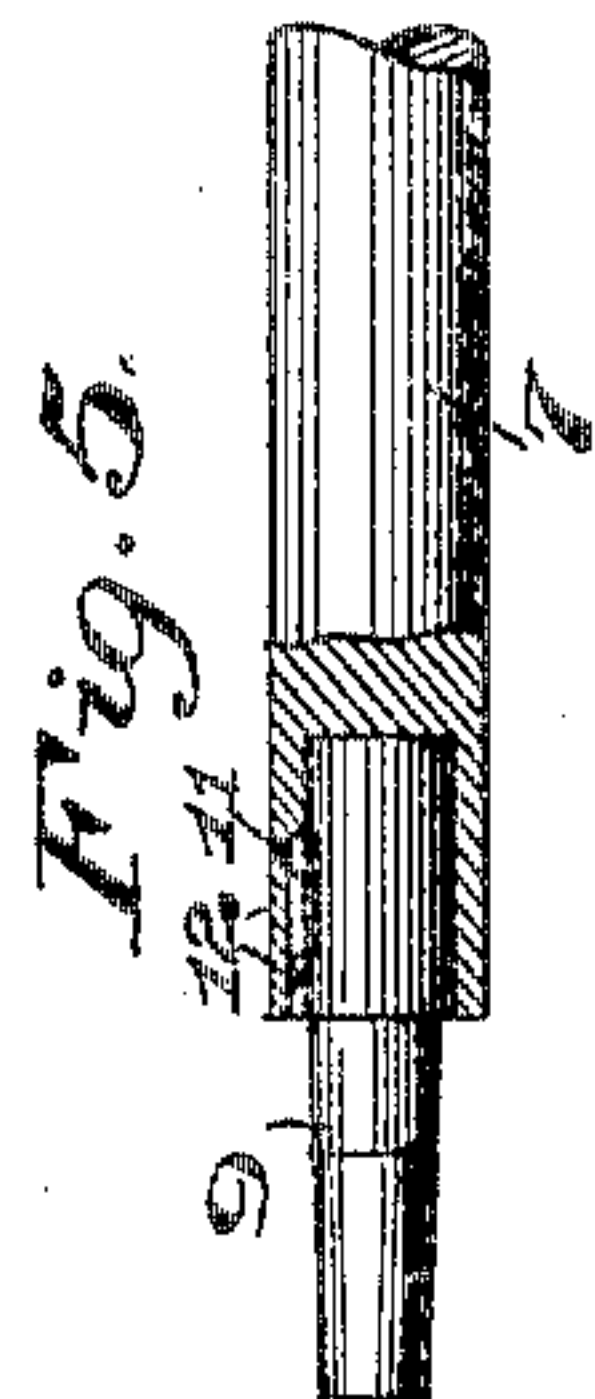


Fig. 5.

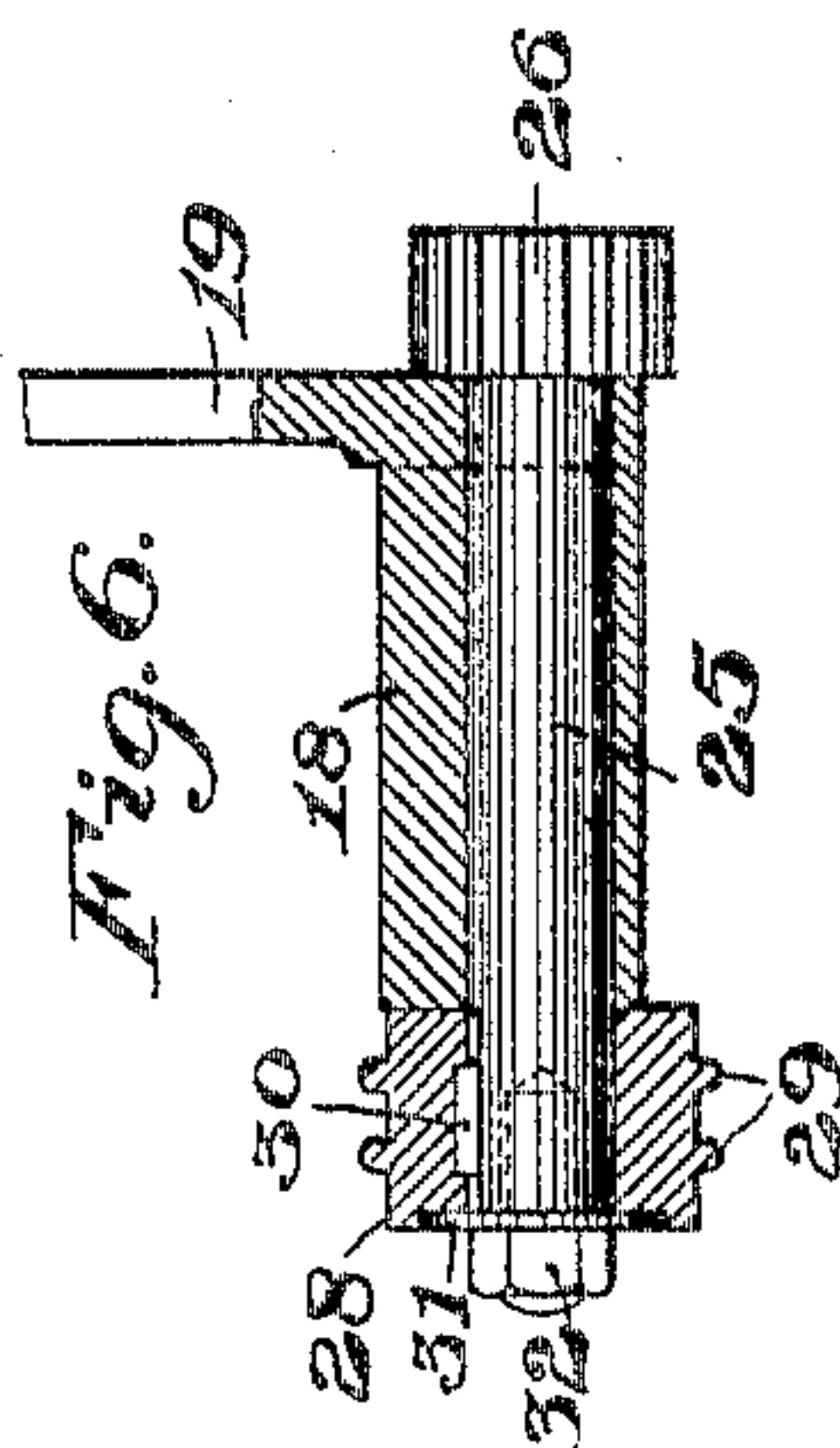


Fig. 6.

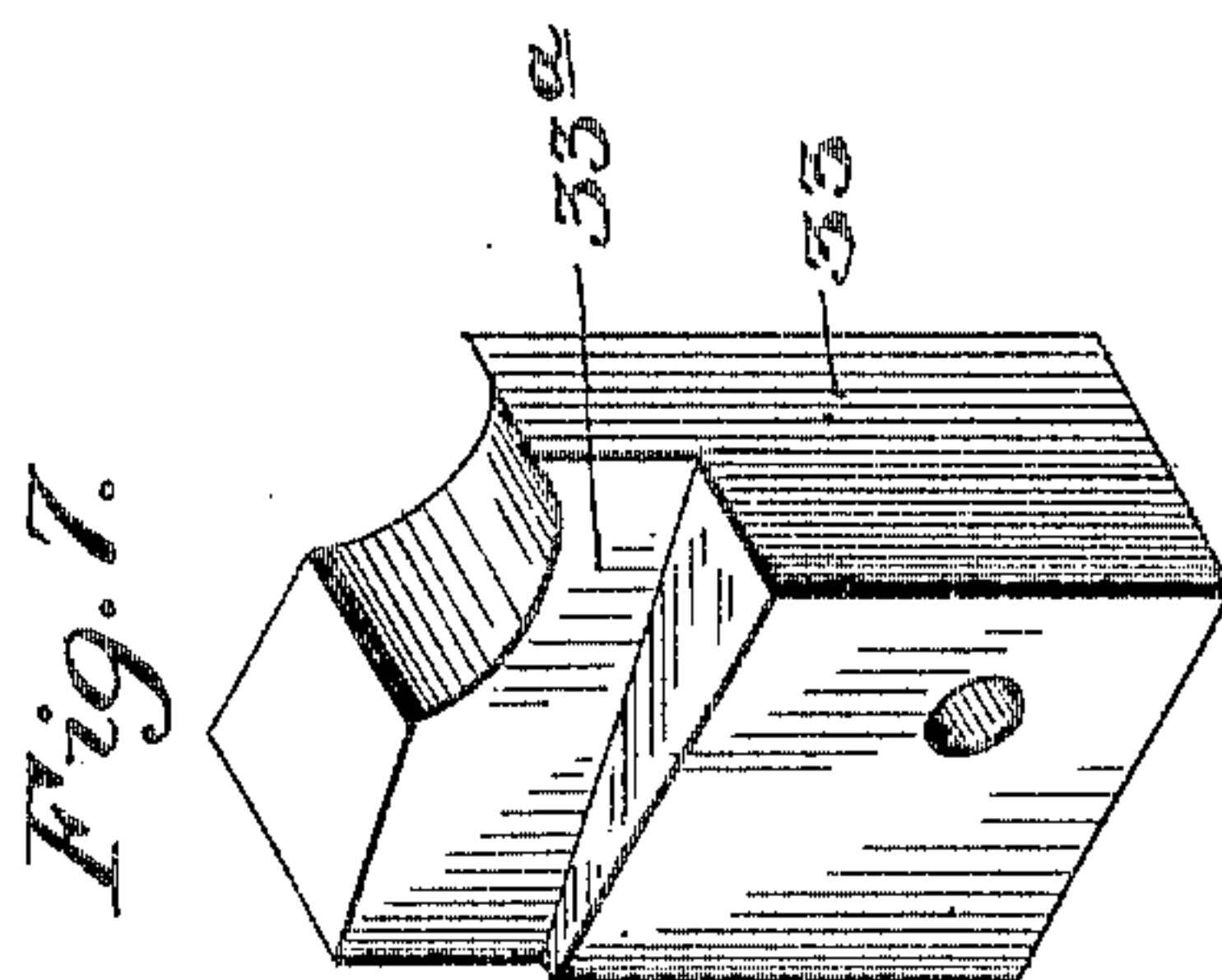


Fig. 7.

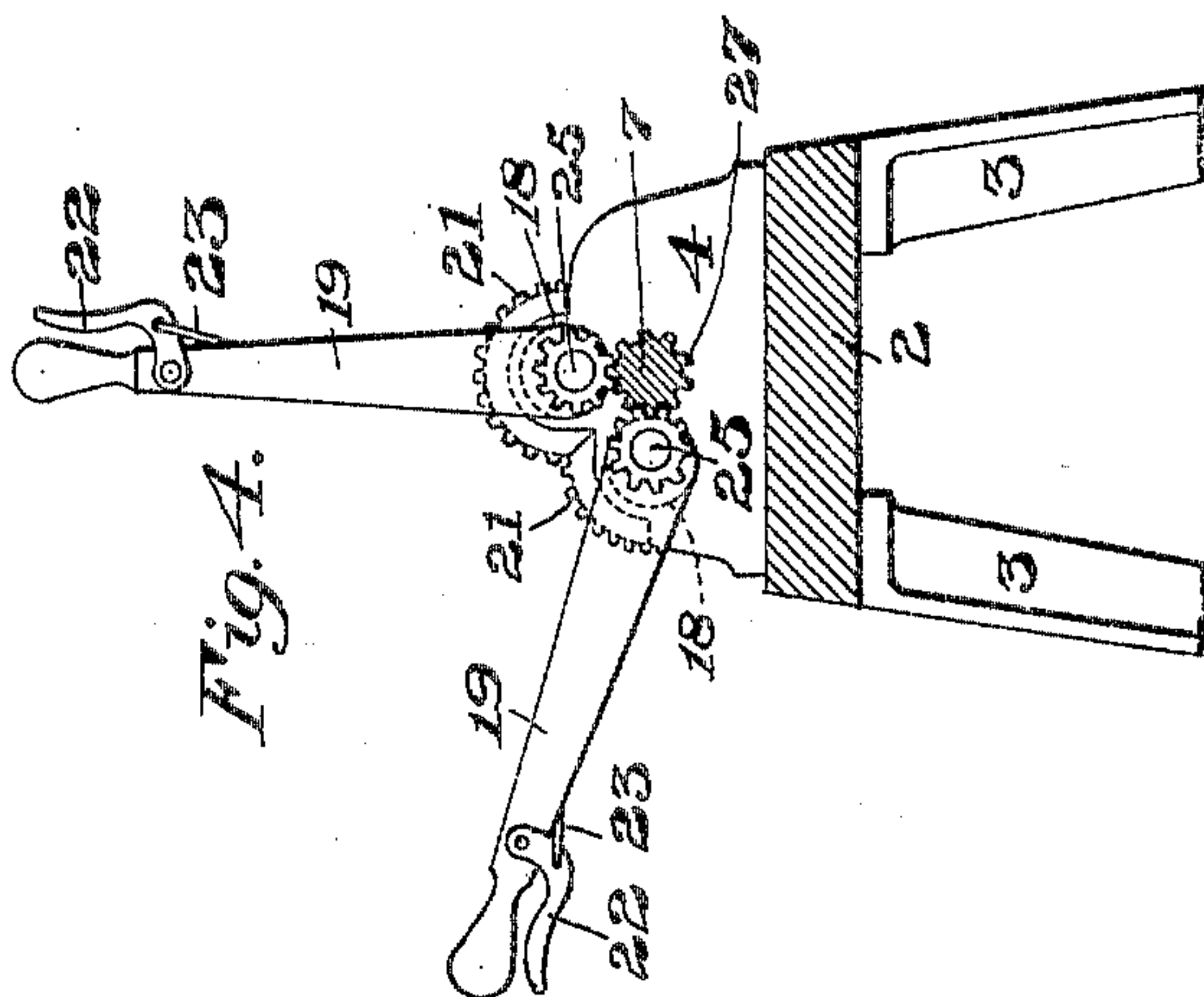


Fig. 4.

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UNITED STATES PATENT OFFICE.

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APPARATUS FOR THE MANUFACTURE OF HELICAL FORMS.

No. 797,189.

Specification of Letters Patent.

Patented Aug. 15, 1905.

Application filed March 13, 1905. Serial No. 249,755.

To all whom it may concern:

Be it known that I, WILLIAM P. FARBER, a citizen of the United States, residing at Oakmont, in the county of Allegheny and State of Pennsylvania, have invented or discovered new and useful Improvements in Apparatus for Manufacture of Helical Forms, of which the following is a specification.

My invention relates to the manufacture of spring coils or series of convolutions with or without subsequent shearing into single coils, and is particularly adapted to the manufacture of helical springs and spiral or split washers. It is especially designed for such coiling of rectangular bars used in making split washers.

The purpose of my invention is to provide a means of manufacture whereby helical forms and nut-locks of the split-washer type can be formed rapidly, cheaply, and of perfect form. By its use I am enabled to produce helices of perfect form without the mutilation thereof concomitant with the machines now used and especially am enabled to produce helical forms from high-carbon steel and of comparatively large dimensions, which is impracticable in the methods and machines now in use. Heretofore in forming helical forms it has been the practice to grip the end of the blank or bar and wind same on a mandrel. The form must be wound cold, rendering it impossible to so coil high-carbon steel, all of which defects are great detriments in the manufacture of nut-locks of the split-washer type, and these difficulties my apparatus is especially designed to overcome.

In the accompanying drawings, which form part of the specification, Figure 1 is a front view of my machine in elevation. Fig. 2 is a side elevation of the apparatus and shows its relation to the heating-furnace and the heated rod or bar fed therefrom into the machine. Fig. 3 is a plan view of the apparatus, showing the blank or bar in coiled form passing from the machine to the catcher. Fig. 4 is a sectional elevation through the dotted line I I in Fig. 1. Figs. 5, 6, and 7 are detail views, Fig. 5 being a view of a portion of the main shaft and the mandrel seated therein. Fig. 6 is a sectional view of a portion of one of the eccentrics and

one of the roll-shafts mounted therein. Fig. 7 is a perspective view of the guide-block shown in Figs. 1 and 2.

In the drawings, 1 represents an aperture in a heating-furnace whence the blank A, usually a bar or rod, is passed to the principal machine. In the machine proper a bed-frame 2, mounted on suitable legs 3 3, has the head-stock 4 adjustably mounted in the groove 5 with the alining screws 6 6. A main shaft 7 in the bearings 8 8 extends through the head-stock 4 and has the mandrel 9 seated in the end of said shaft and fixed therein by means of the key 11 and slot 12, as shown in Fig. 5. Pulleys 13 13 or their equivalent impart motion to the shaft 14, journaled in the hangers 15 15, and the gear 16 on said shaft 14 meshes with the gear 17 on aforementioned main shaft 7.

Eccentrics 18 18, mounted in the head-stock 4, have operating-arms 19 19, with dogs 20 20 engaging the series of teeth 21 21 and actuated by the levers 22 22, the connecting-rods 23 23, and the springs 24 24. Mounted in said eccentrics 18 18 are shafts 25 25, having the gears 26 26 rigidly fixed upon their inner ends and meshing with the gear-teeth 27 in main shaft 7. Upon the outer ends of the shafts 25 25 are mounted rolls 28 28, having ribs or rings 29 29, the rings of the lower roll being situate somewhat nearer the outer end of the roll, depending upon the space desired between successive coils of the helix to be produced. Keys and keyways 30 prevent the rolls 28 28 from turning on their shafts, and the washers 31 and nuts 32 retain the rolls thereon. A guide-block 33 with the tapered face 33^a gives pitch to the helix being formed and prevents the coils from lapping on one another.

In Fig. 3, in connection with a plan view of my machine, is shown a catcher used to receive the formed helix from off the mandrel. The rod 34 on its axes 35-35 turns in the bearings 36-36, mounted upon suitable standards. The formed helix feeds onto said rod 34, positioned in continuity with the end of the mandrel 9. 37 represents a portion of a pit which provides clearance for said rod 34 when revolving. The mandrel 9 tapers slightly from the butt to a point opposite the outer ring or rib on lower roll, and from this point

to the end the taper is more abrupt in order to free the formed coils of the helix.

The operation of my apparatus is as follows: Rotation being imparted to the pulley 13 is transmitted through the gear 16 on the shaft 14 to the gear 17, which revolves the shaft 7, having the mandrel 9 fixed in the end thereof. The gear-teeth 27 on said shaft 7 engage and rotate the gears 26 26, which are of uniform pitch with said gear-teeth 27, thereby rotating the rolls 28 28 in a direction opposite to that of the mandrel 9. The blank A, which is to be formed into the helix B, is fed, preferably, directly from the heating-furnace 1, between the mandrel 9 and the inner groove of the upper roll 28, thence down between the mandrel and the lower roll 28, thence under the outer groove of upper roll 28, and then between mandrel and outer groove of lower roll 28, the grooves on upper rolls referred to being formed by the rings 29 29 and are out of alinement to give the desired pitch or space between successive coils of the helix, which end is aided by the bevel 33^a on the guide-block 33. Before engaging with the roll and mandrel the end of the blank or bar A is given a slight downward bend to facilitate its conforming with the mandrel, or a slight notch in the inner groove of the lower roll may be made to serve the same purpose—*i. e.*, to catch the end of the blank and deflect it downward around the mandrel. The eccentrics 18 18, operated by the arms 19 19, permit of the ready adjustment of either or both of the rolls 28 28, providing for variations in the sizes of the blanks A and for the entering of the blank. The helix as the coils are formed passes off the mandrel 9 onto the rod or arm 34 of the catcher, which carries the completed helices away from the machine. The helices may then be cut on suitable shears to form nut-locks of the split-washer

type, which are then tempered and tested, as usual.

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

1. In an apparatus for making helical forms, the combination of a mandrel revolving in one direction, rolls approximately concentric to said mandrel and revolving in a direction opposite to the direction of said mandrel, alternately-advanced rings on the peripheries of said rolls, and eccentric means for shifting the position of said rolls relatively to said mandrel and independent of each other.

2. In an apparatus for making helical forms, the combination of a mandrel revolving in one direction, rolls approximately concentric to said mandrel and revolving in a direction opposite to the direction of said mandrel and having alternately-advanced rings on said rolls, eccentric means for shifting the position of said rolls relatively to said mandrel and to each other, and a beveled guide-block adjacent to said mandrel.

3. In an apparatus for making helical forms, the combination of a mandrel, rolls approximately concentric thereto and having alternately-formed grooves in the peripheries of said rolls, eccentric bearings for the shafts of said rolls, arms separately operating said eccentrics, a beveled guide-block adjacent to said mandrel, and revolving arms successively positioned in continuity with said mandrel to receive the helices off the mandrel substantially as described.

Signed at Oakmont, Pennsylvania, this 9th day of March, 1905.

WILLIAM P. FARBER.

In presence of—

C. LUDLOW LIVINGSTON,
J. E. MURRAY.