

No. 835,320.

PATENTED NOV. 6, 1906.

I. L. POMEROY.

UNIVERSAL WORK HOLDER FOR POLISHING MACHINES.

APPLICATION FILED AUG. 7, 1906.

5 SHEETS—SHEET 1.

Fig. 1.

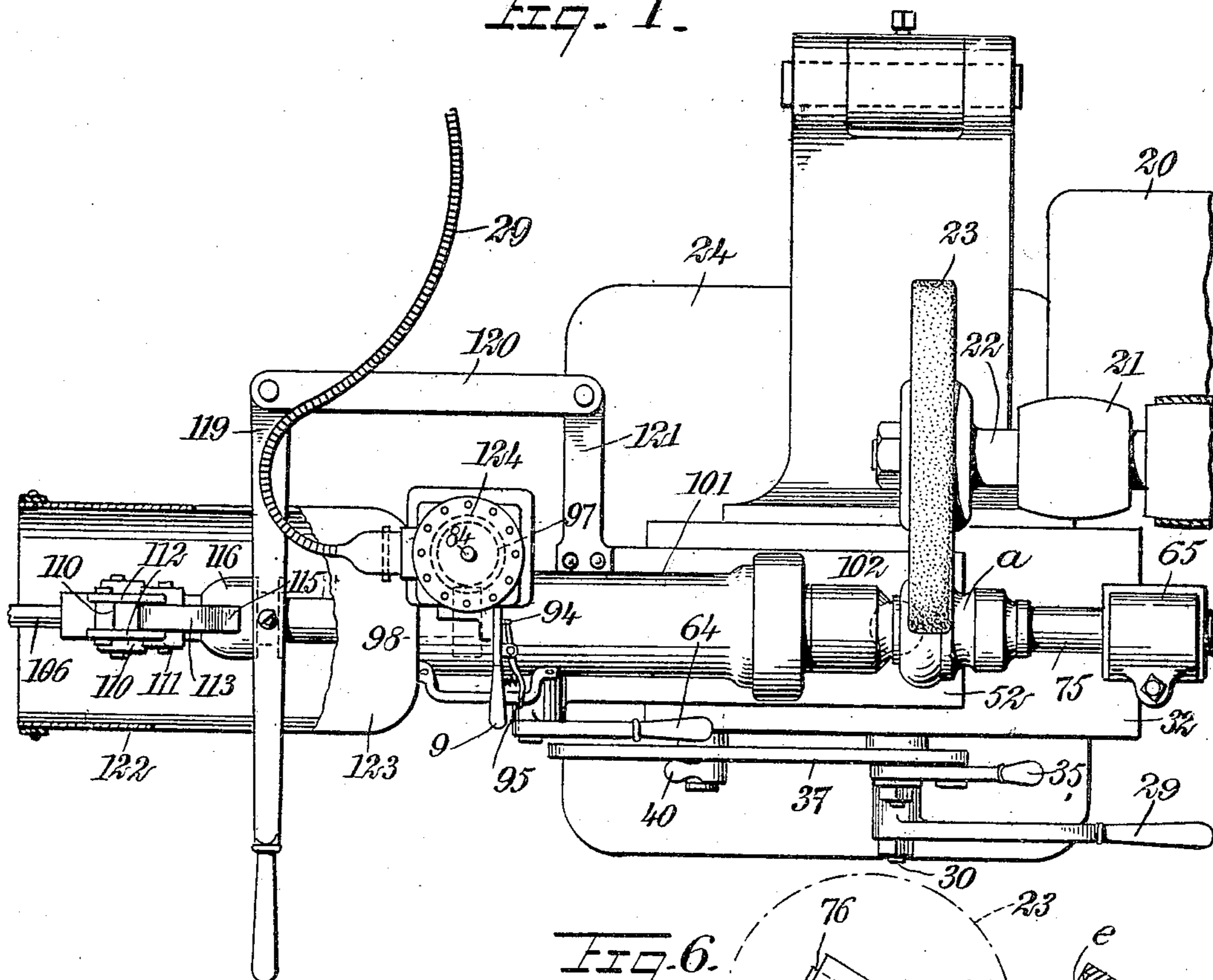


Fig. 6.

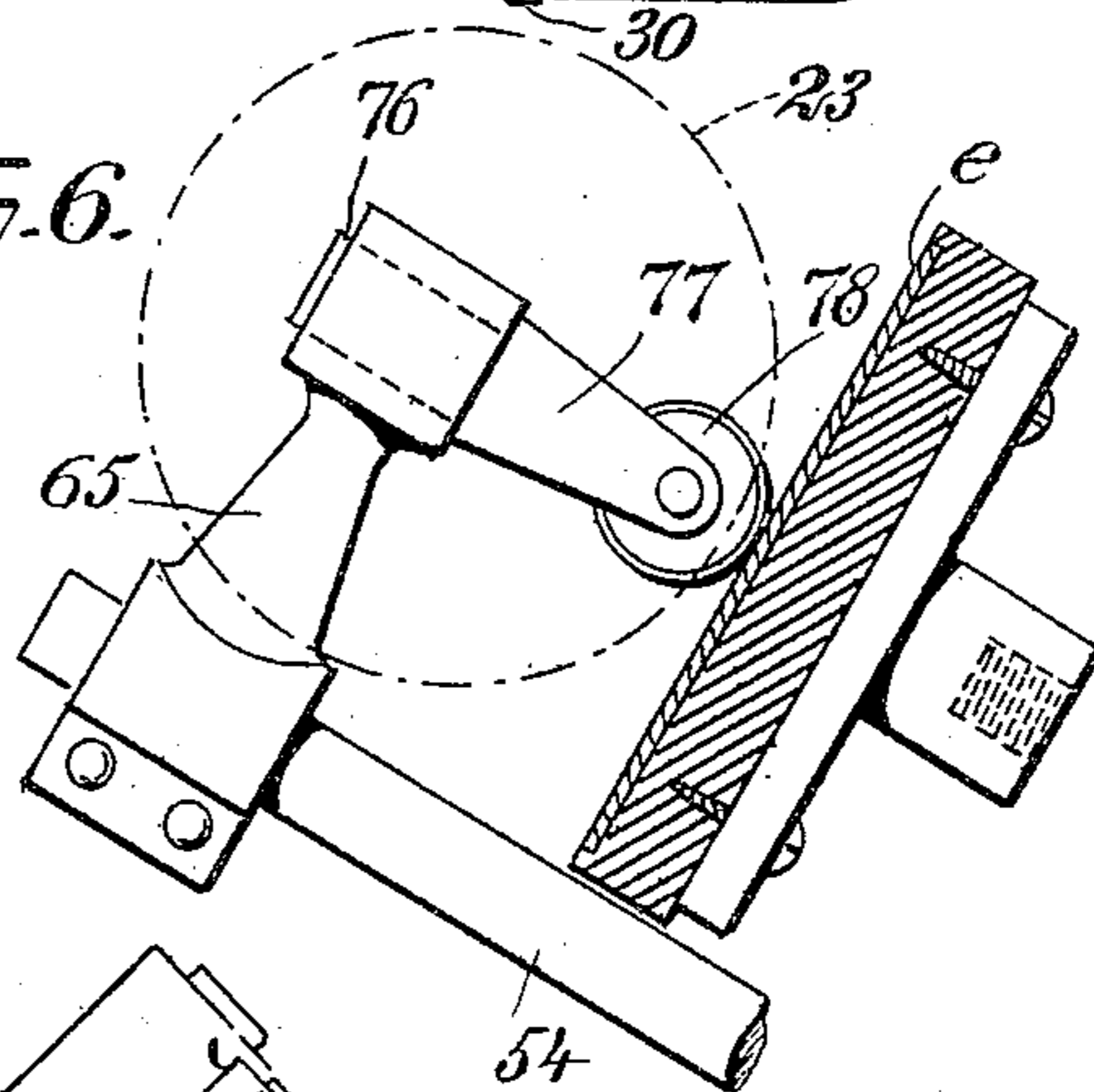


Fig. 5.

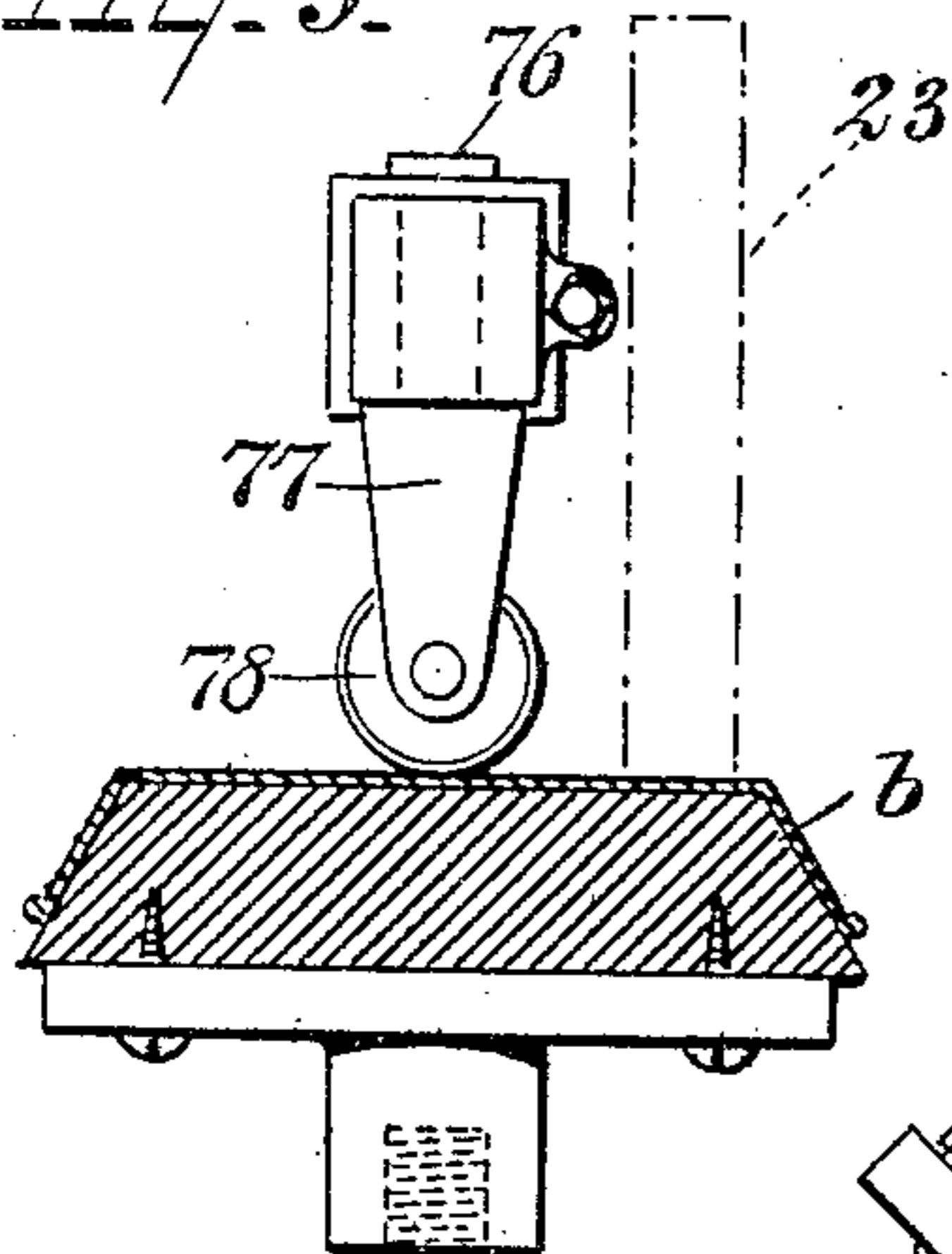
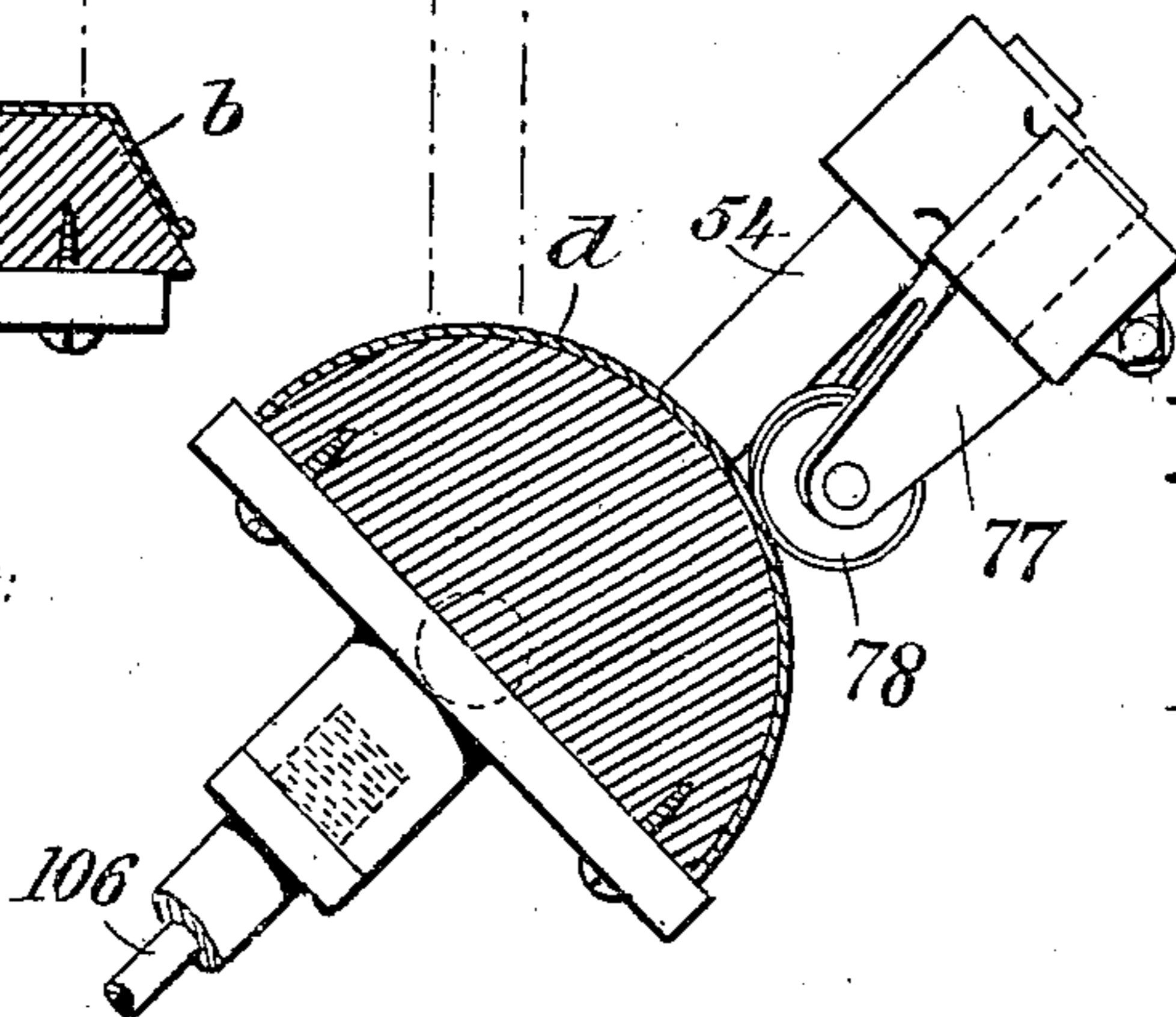


Fig. 7.



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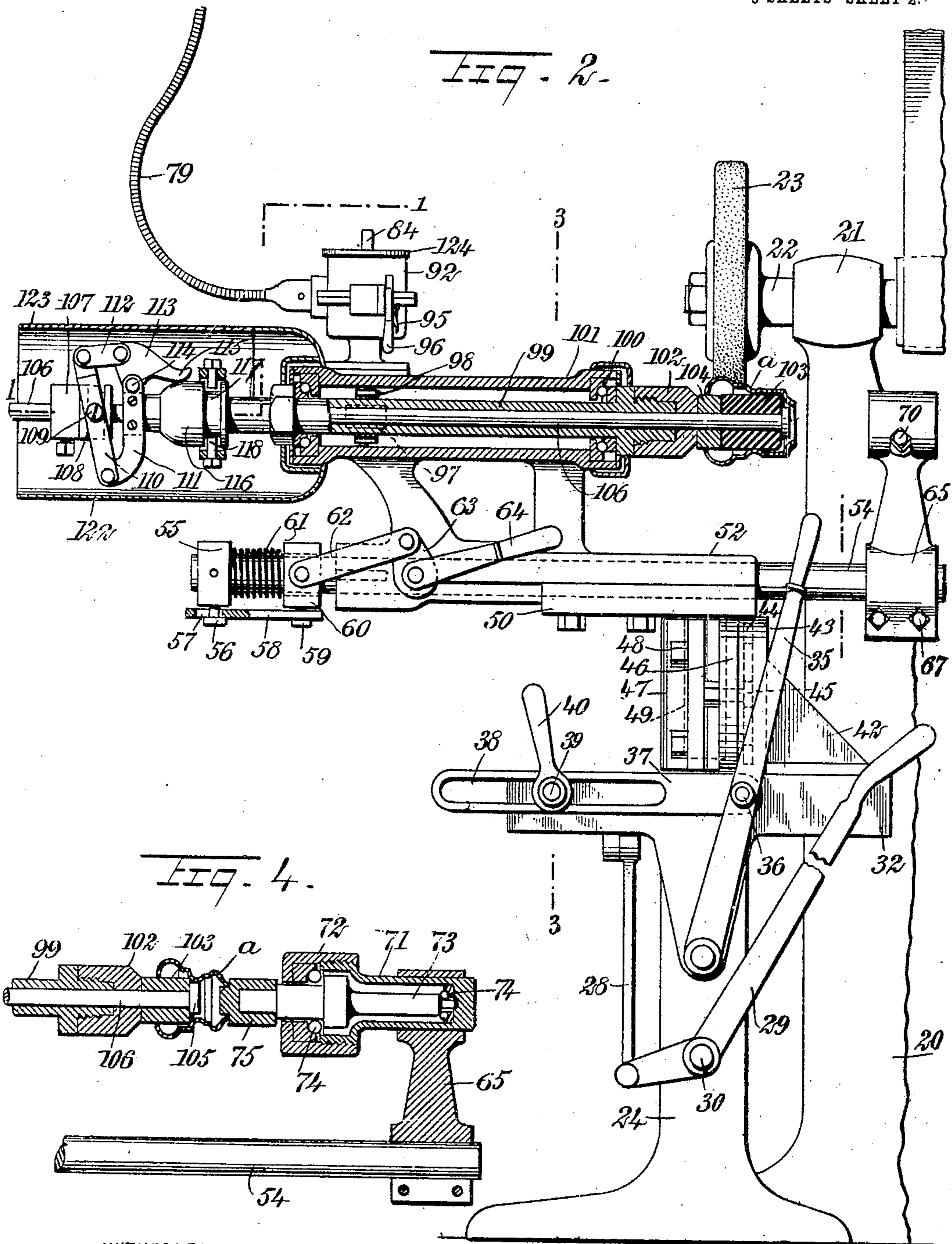
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6 SHEETS—SHEET 2.



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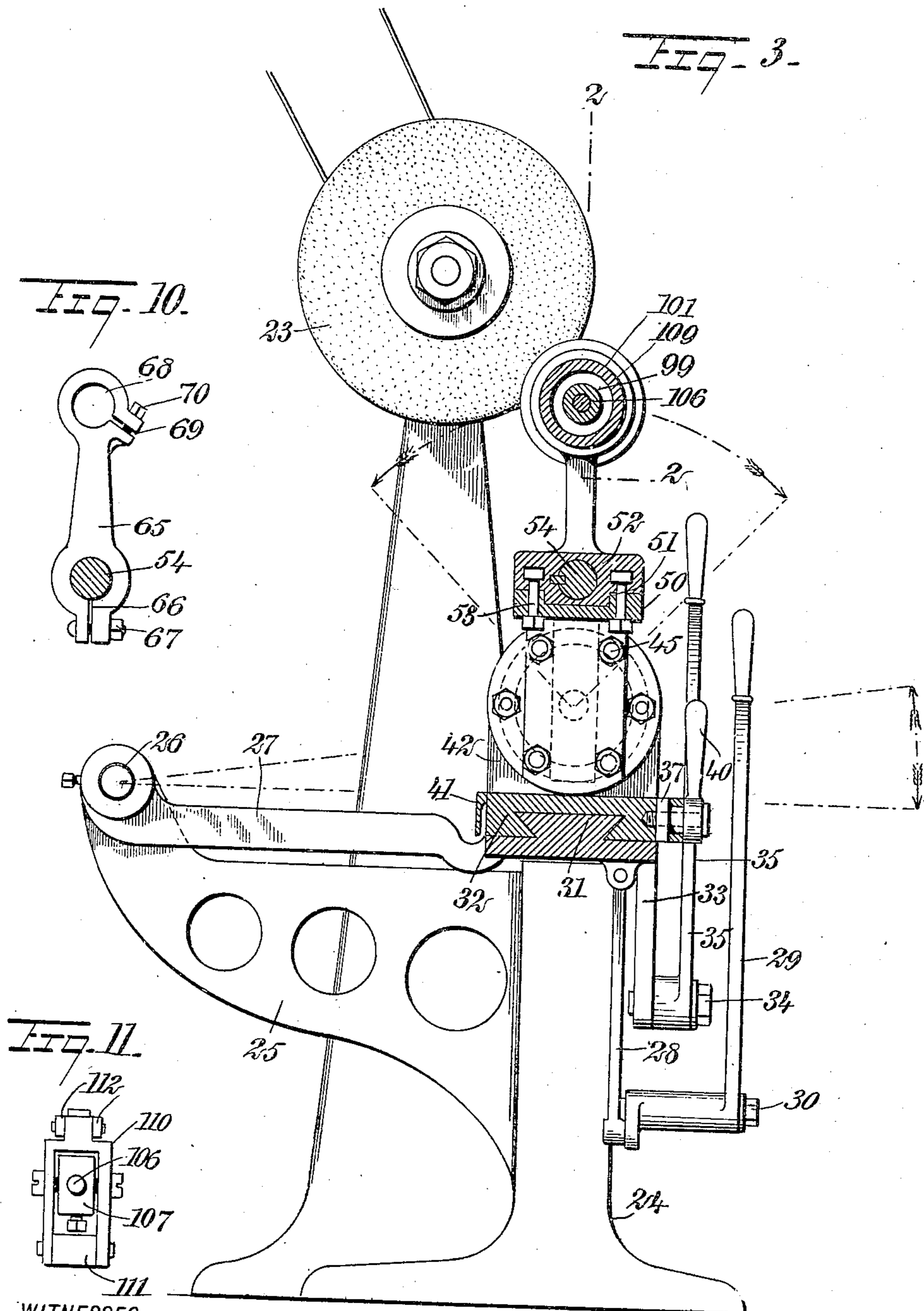
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5 SHEETS—SHEET 3.



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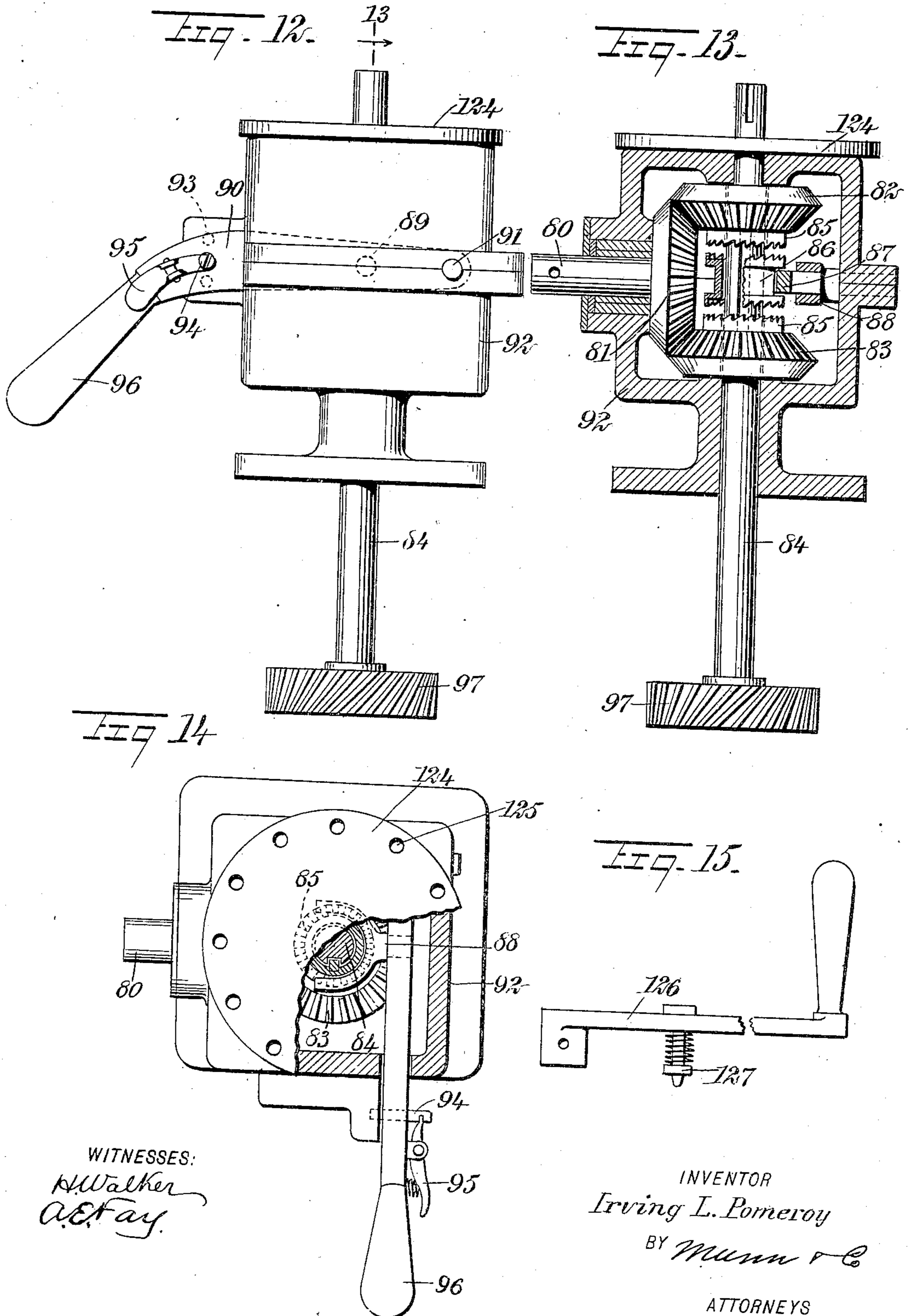
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5 SHEETS—SHEET 4.



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5 SHEETS—SHEET 5.

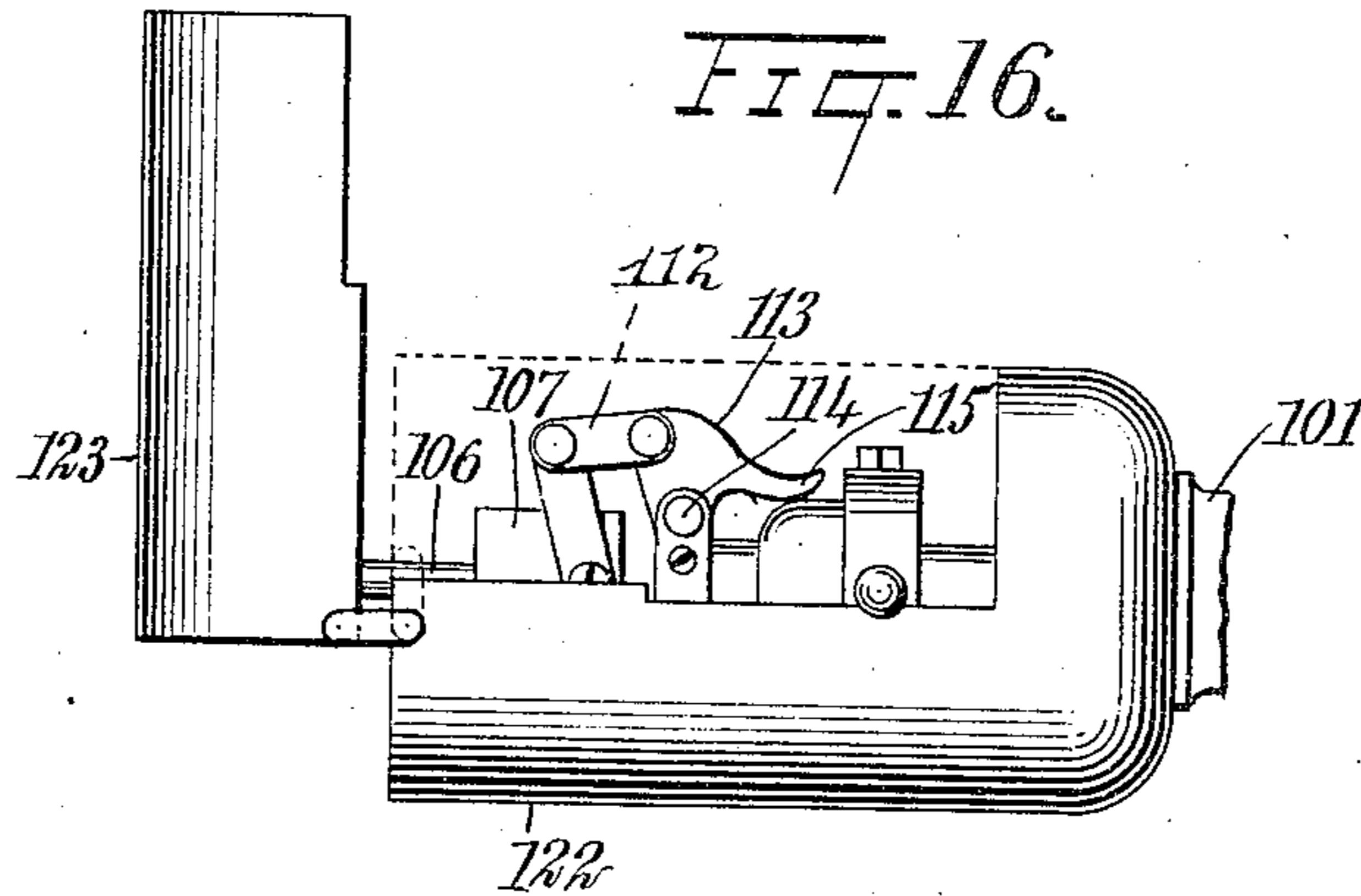
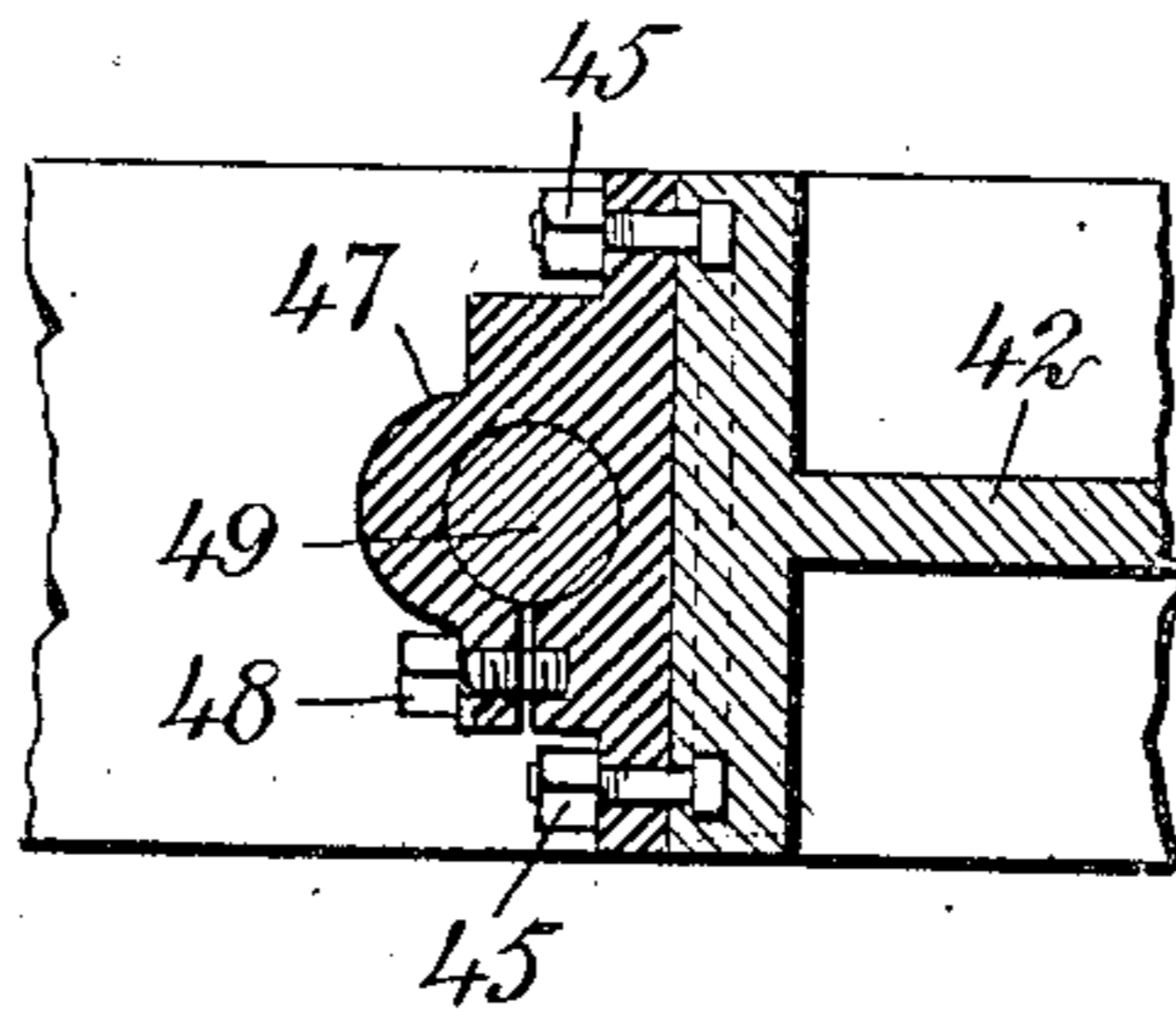


Fig. 17.



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UNITED STATES PATENT OFFICE.

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UNIVERSAL WORK-HOLDER FOR POLISHING-MACHINES.

No. 835,320.

Specification of Letters Patent.

Patented Nov. 6, 1906.

Application filed August 7, 1905. Serial No. 273,041.

To all whom it may concern:

Be it known that I, IRVING L. POMEROY, a citizen of the United States, and a resident of Lockport, in the county of Niagara and State of New York, have invented a new and Improved Universal Work-Holder for Polishing-Machines, of which the following is a full, clear, and exact description.

My invention relates to a work-holder for polishing or buffing machines and for other mechanism of a similar character.

The work-holder is designed to be used for supporting work to be polished or buffed by means of a wheel mounted on a stationary axis; and the principal objects thereof are to provide for the universal adjustment of the holder, so that it can be applied to any desired kind of work and so that the work may be manipulated in any desired manner to secure the desired polishing action without introducing any necessity for moving the polishing-wheel itself, except the ordinary rotation of the same upon its axis. In accomplishing these results I have provided means to so facilitate the work of polishing as to save a large percentage in the cost of labor in operations of this character.

Further objects and advantages of the invention will appear below.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan of a work-holder, showing my invention, partly in section, on the line 1 1 of Fig. 2. Fig. 2 is a side elevation of the same, partly in section, on the line 2 2 of Fig. 3. Fig. 3 is an end elevation, partly in section, on the line 3 3 of Fig. 2. Fig. 4 is a sectional view of certain parts shown in Fig. 2, also including a tail-center. Figs. 5, 6, and 7 are views of details showing the method of using my machine on different kinds of work. Fig. 8 is a sectional view of one form of chuck which can be employed upon my machine. Fig. 9 is a side elevation of the same with parts removed. Fig. 10 is an end elevation of a bracket constituting a part of my invention, a support for the same being shown in section. Fig. 11 is an elevation of a portion of the left end of the machine as shown in Fig. 1. Fig. 12 is a side elevation of a speed-changing device constituting a part of the invention. Fig. 13 is a sectional view on the line 13 13 of Fig. 12. Fig. 14 is an end elevation of the parts shown in Fig.

12. Fig. 15 is an elevation of a crank which may be employed on the machine. Fig. 16 is a side elevation of the casing with the upper part swung back, and Fig. 17 is a sectional view showing the split collar for securing the head to the work-spindle.

As the machine is designed to be operated in connection with a polishing-wheel mounted to revolve on a stationary axis, I have illustrated a standard 20, having a bearing 21, a shaft 22, and a polishing-wheel 23. It will be understood that the polishing-wheel is illustrated in one form which is suitable for a certain form of work, but that the machine is intended to be used with all kinds of polishing-wheels, according to the character of the work to be performed, and that one of the advantages of the machine is that it does not necessitate the manipulation of the polishing-wheel, except to turn it about on its axis in the simplest manner possible.

In the vicinity of the standard 20 I provide a second standard 24 of convenient shape and size for supporting the various elements to be described. Upon this standard is a projection 25, carrying a shaft 26. Upon this shaft is mounted a tilting arm 27, extending toward the front of the machine. Connected with this arm is a link 28, designed to be operated by a lever 29, pivoted on a shaft 30, which is supported by the standard 24. The operation of this lever, as will be obvious, will cause a tilting motion of the arm 27, which is indicated by broken lines in Fig. 3.

The arm 27 is provided with a dovetailed or other convenient form of projection 31, which constitutes ways for a sliding plate 32. This plate is adapted to slide transversely of the arm, and the arm is provided with a depending member 33, upon which is a stud 34, to which is pivoted a lever 35. This lever is provided with a stud 36, connected with a slide 37, which has a slot 38. Passing through this slot and connected with the plate 32 is a stud 39, having a nut 40, by means of which it can be tightened in the slot 38 to the slide 37. When this is tightened, the movement of the lever 35 will cause the plate 32 to reciprocate on the ways 31 in an obvious manner.

Located over the outer surface of the plate 32 is a hood 41 for protecting the bearing-surfaces from dust and dirt. Upon the plate 32 is a bracket 42, securely held in position in any desired manner. This

bracket is provided with a face-plate 43, having a T-shaped slot 44 of circular form in which a series of T-bolts 45, connected with a head 46, is designed to operate. By this construction it will be seen that the head 46 can be placed at any desired vertical angle upon the bracket. This head is provided with a split bearing 47, having bolts 48 for securing it tightly upon a work-spindle 49. This work-spindle is connected with and supports a bracket 50, and by loosening the bolts 48 it will be seen that this bracket can be placed at any desired angle in a horizontal plane.

The bracket is provided with ways 51, in which slides a housing 52. Bolts 53 are provided for securing the housing to the bracket in any desired position. Through the housing passes a draw-bar 54. This draw-bar is provided with a fixed collar 55, having a stud 56, passing through a slot 57 in a link 58, which is connected, by means of a stud 59, to a sliding collar 60, also on the draw-bar. A spring 61 normally forces the collars 55 and 60 apart. The collar 60 is connected, by means of a link 62, with a bell-crank 63, having a handle 64 for operating it. It will be seen that by the manipulation of this handle or lever the position of this draw-bar in the housing can be regulated. The spring provides for exerting a yielding force upon the draw-bar at all times to force it toward the housing. At the other end of the draw-bar it is provided with a bracket 65, which, as shown in Fig. 10, has a slit 66 and a bolt 67, by means of which it can be applied to the draw-bar and clamped in any desired position thereon. This bracket is provided with a passage 68, a second slit 69, and bolts 70, by means of which a tail-center 71 can be clamped to the bracket. This tail-center is provided with a cap 72, adapted to be screwed in position, and is hollow to receive a spindle 73. It is also provided with a ball-bearing 74 for this spindle. This construction secures an antifriction support for the spindle and permits the latter to be readily located in a manner to be described.

The spindle is provided with a tail-center 75, which can be made in various forms. Figs. 5, 6, and 7 illustrate a form which is especially applicable to large work. In this form the tail-center has a spindle 76, corresponding to the spindle 73, this being provided with a holder 77, carrying a roll 78, adapted to engage the work.

The parts so far described are auxiliary to the means for operating the work, which will now be described in detail.

I have shown the power as being applied through a flexible shaft 79. This shaft is connected with a stud 80, on which is a gear 81. This gear is designed to mesh with a pair of gears 82 and 83, mounted on a driving-shaft 84. These gears are separated from

each other, and each is provided with a clutch member 85. Located between the two clutch members is a second clutch member 86, which is rotatably mounted in a frame 87. The clutch member 86 is designed to slide along the shaft 84, and a fork 88 is provided for sliding it. This fork is engaged by a pin 89, mounted upon a lever 90, which in turn is pivoted at a point 91 to a casing 92, in which the parts last described are located. This casing is provided with three stop-pin holes 93 for a stop-pin 94, which is pivoted on the lever. The stop-pin is provided with a handle 95 and the lever with a handle 96, and it will be readily seen that by the manipulation of the two handles and placing the stop-pin in any one of the said pin-holes the power may be transmitted to the shaft 84 in either direction or it may be entirely disconnected from the power by placing the clutch member 86 in the position shown in Fig. 13.

The shaft 84 is provided with a forty-five-degree spiral gear 97, engaging with a similar gear 98, so as to transmit power, preferably at the same rate of speed, to a hollow shaft 99. This shaft is mounted, by means of anti-friction-bearings 100, in a casing 101, which is mounted upon the housing 52. On the hollow shaft is mounted a removable cap 102, which can be replaced by a chuck for holding work, if desired. In the form illustrated in the first four figures a flexible or expansible member 103, preferably formed of rubber, is provided at the end of the cap and separated from it by a washer 104.

In order to hold hollow articles of an inner diameter about equal to the outer diameter of the member 103, the work is placed upon the latter, and it is then compressed to force its surfaces outwardly into firm engagement with the inside of the article to be held. This purpose is accomplished in the present instance by means of a plate 105, mounted on a shaft 106, which passes through the hollow shaft 99. This shaft is provided with a block 107 and carries a grooved wheel 108. In the groove of this wheel operates a pin 109 on a lever 110. This lever is supported by a frame 111, mounted on the shaft 99. A link 112 connects the lever on the side opposite to the pin 109 with a second lever 113. This lever is pivoted on a stud 114, mounted on the frame 111, and is provided with a projection 115, adapted to engage a movable cam 116. This cam is provided with a convex or slanting surface and is adapted to slide along the shaft 99 to engage the projection 115 and operate the collar 108, so as to move the shaft 106 in either direction. For operating the cam it is provided with a groove 117, in which engage pins 118, mounted on a lever 119. This lever is shown as connected by a link 120 with a stationary part 121 of the housing. It will be readily observed that the manipulation of this lever 119 controls the longitudinal

motion of the shaft 106 and provides for manipulating it so as to grip the expansible member 103 and cause the latter to engage and hold the work, which in the present instance is represented in the form of a hollow article *a*.

In order to protect the operator from the elements at the rear end of the shafts 99 and 106, I provide a casing consisting of two parts 122 and 123. The upper part is pivotally mounted, so that it can be swung back to allow inspection and manipulation of the parts within.

On the housing 92 I provide an index-plate 124, having any desired number of perforations or impressions 125 to provide for placing the shaft in any desired position. I also provide a removable hand-crank 126, (shown in Fig. 15,) having a spring-pressed pin 127 for use in operating the index-plate. In use the article whether of the form *a* (shown in Figs. 1, 2, and 4) or of the forms *b*, *c*, and *d* (shown in Figs. 5, 6, and 7) or of any other form can be located on the shaft 106 in any desired manner, according to the form of the article. In Figs. 8 and 9 I have shown an expansible chuck made of metal in the form of a cylinder 128, having slits 129, adapted to be expanded by a cone 130 on the end of the shaft 106 and holding a hollow article *e*; but it will be understood that any desired form of holder may be employed.

The tail-center is preferably used upon all ordinary forms of work, but can be dispensed with in such cases as those in which the chuck is sufficient. Also the roller tail-center can be replaced by an ordinary solid or disk tail-center, as shown in Fig. 4, when the form of work admits of it. The operation is then very simple. The power is applied in the desired direction by manipulating the handles 95 and 96, and the lever 64 is moved to cause the shaft or draw-bar 54 to grip the work or to operate the chuck in such a manner as to cause that to grip the work, if such form of chuck is employed. The work is placed to an angle of about forty degrees below the plane passing through the center of the polishing-wheel and about two inches from the face thereof. As it is below the operating-surface of the polishing-wheel, it enables the operator to apply a polishing medium in a most convenient manner, as he has free access to the face of the wheel. The operator can also see the surface which is being operated upon by the wheel without moving from the normal position. When the parts are set up ready to be operated, the lever 35 can be moved so as to bring the work under the wheel, and then the lever 29 is operated to elevate the work into engagement with the wheel. In case it is desired to place the work at an angle this can be done by manipulating the bolts 45, as is indicated by the broken lines in Fig. 3. The standard 49 can also be turned in an obvious

manner, so as to present the work at a different angle to the wheel, this being especially valuable for conical and curved surfaces. By the employment of these features, especially the hollow shaft and draw-bar passing through it, the user of the machine is enabled to make up various chucks that he is likely to use in the most simple manner and keep them in stock, where they can be applied at will without any complicated adjustment of the mechanism.

The forms of chucks herein shown are intended merely to show certain variations which can be used, and it will be readily understood that many others can be employed in a similar manner. The draw-bar or shaft 106 is used principally to operate expansion and compression chucks, which may be made of iron, steel, or rubber or any other suitable material, according to the design of work to be operated upon. The tail-center is not necessarily employed at all times, but is preferably used with the other forms of chucks shown, and in the form shown in Figs. 5, 6, and 7 it is especially valuable. As this element is yieldingly held against the work by the spring 61, it affords a pressure upon the work and yet can be regulated in such a manner that the pressure will not be excessive. The spring which takes up the variation in the work is made in different sizes and strengths, according to the different classes of work. As is indicated in Fig. 7, the tail-center can be set over to one side of the work by placing the bracket 55 at an angle to the vertical on the draw-bar 54, so as to permit the polishing-wheel to engage the center of the article to be polished. For a spherical article the work can be swung over, as also shown in this figure and as indicated by the broken lines in Fig. 3. It will thus be seen that practically a universal adjustment is practicable and that practically all kinds of work can be operated upon. The inside of hollow work can be polished in an obvious manner by using the proper polishing-wheel and chuck.

The ball-bearings on the work-spindle or shaft 99 can be readily employed, because it is not necessary for this shaft to run as true as is the case with a lathe-spindle. A little variation can be had without damaging the work.

The use of the index-plate will be obvious when it is stated that work having plane surfaces upon its sides may be polished in the machine—as, for example, hexagonal-shaped disks. In this case the flexible shaft is disconnected and the hand-crank 126 is put on the shaft 84. As the hand-crank makes one turn to turn the spindle around once, it is only necessary to stop the rotation of the shaft when the work has been rotated a sufficient number of degrees, this being indicated by the holes in the index-plate.

By the use of the flexible shaft for operating the machine the operator is enabled to swing the work-spindle around into any desired position and still revolve the work by power in the vicinity of the polishing-wheel. Another operation which can be performed on the machine is the removal of the screw-chuck when employed by reversing the work-spindle 99, and thus employing the motor for this purpose.

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

1. A work-holder comprising a draw-bar or shaft, a bracket adjustably mounted on said draw-bar, means for moving the draw-bar longitudinally, and a tail-center supported by said bracket.

2. A work-holder comprising a slidable draw-bar, resilient means for forcing said draw-bar in one direction, means for moving the draw-bar, a bracket mounted on the draw-bar and adjustable around the draw-bar, and a tail-center mounted on the bracket.

3. In a polishing-machine, the combination of a housing, a draw-bar movably mounted therein, a tail-center mounted on the draw-bar, means for longitudinally moving the draw-bar mounted on the housing, a spring for normally forcing the draw-bar toward the housing, and means for movably mounting the housing.

4. In a polishing-machine, the combination of a work-spindle, means for adjustably mounting the work-spindle at any desired horizontal angle, a bracket on said spindle, a housing adjustably mounted on the bracket, a draw-bar movably mounted in the housing, a tail-center mounted on the draw-bar, and means for moving the draw-bar longitudinally.

5. In a polishing-machine, the combination of a work-spindle, means for adjustably mounting the work-spindle at any desired horizontal angle, a bracket on said spindle, a housing adjustably mounted on the bracket, a draw-bar movably mounted in the housing, a tail-center mounted on the draw-bar, and means for moving the draw-bar longitudinally, said means comprising a bell-crank mounted on the housing, a link connected with the bell-crank, a collar slidably mounted on the draw-bar, a collar fixedly mounted on the draw-bar, and a link connecting said collars.

6. In a work-holder, the combination of a support, a draw-bar movably mounted therein and adapted to carry a tail-center, a collar fixed to said draw-bar, a second collar slidably mounted on the draw-bar, a link connecting said collars, a spring mounted on the draw-bar between the collars and normally forcing said collars apart, and means for sliding the slidable collar, said means being mounted upon the support.

7. In a polishing-machine, the combination of a work-spindle, means for adjustably mounting the work-spindle at any desired horizontal angle, a bracket on said spindle, a housing adjustably mounted on the bracket, a draw-bar movably mounted in the housing, a tail-center mounted on the draw-bar, means for moving the draw-bar longitudinally, and means for supporting said spindle, said means comprising a split bearing, means for tightening said bearing on the spindle to hold the spindle in any desired position in the bearing, a bracket for holding the bearing, and means for adjustably securing the bearing to the bracket.

8. In a work-holder, the combination of a support having ways, a plate movably mounted on said ways, means for sliding the plate along the ways, a bracket on the plate, a head connected with the bracket, means for securing the head at any desired vertical angle on the bracket, a bearing adjustably supported on the head, a work-spindle mounted in said bracket, and means supported by the work-spindle for holding an article to be polished in position on the machine.

9. In a work-holder, the combination of a tilting arm, means for tilting said arm about a center, a plate slidably mounted on the arm, a work-spindle connected with said plate and universally adjustable with respect thereto, said work-spindle having means for carrying a tail-center.

10. In a polishing-machine, the combination of a pivoted arm, a link depending therefrom, a lever for operating said link and swinging the arm about its pivot, ways on said arm located parallel to the direction of the axis of said pivot, and means carried by said ways for supporting a tail-center.

11. In a work-holder, the combination of an arm mounted to tilt about a center, ways on the arm parallel with the axis of said center, means for tilting said arm toward and from a polishing-wheel, a plate mounted on said ways to move transversely of the arm, a slide connected with said plate, a lever for operating said slide to move the plate, and a tail-center universally adjustable on said plate.

12. In a polishing-machine, the combination of a polishing-wheel rotatably mounted on a stationary axis, a standard mounted adjacent to said wheel, a movable arm on the standard, a lever for moving said arm toward and from the wheel, a sliding plate mounted on said arm, the slide having a slot located adjacent to said plate, a pin connected with the plate and passing through the slot, a nut on said pin, said nut being adapted to secure the plate to the slide, a lever for moving said slide transversely of the arm, and means mounted above said plate for supporting work below said polishing-wheel.

13. In a polishing-machine, the combina-

tion of a polishing-wheel rotatably mounted on a stationary axis; a standard mounted adjacent to said wheel, a movable arm on the standard, a lever for moving said arm toward and from the wheel, a sliding plate mounted on said arm, the slide having a slot located adjacent to said plate, a pin connected with the plate and passing through the slot, a nut on said pin, said nut being adapted to secure the plate to the slide, a lever for moving said slide transversely of the arm, and means mounted above said plate for supporting work below said polishing-wheel, said means comprising a bracket on the plate, a head adjustably mounted on the bracket, a work-spindle adjustably mounted on the head and a housing adjustably mounted on the work-spindle.

14. In a polishing-machine, the combination of a polishing-wheel rotatably mounted on a stationary axis, a standard mounted adjacent to said wheel, a movable arm on the standard, a lever for moving said arm toward and from the wheel, a sliding plate mounted on said arm, the slide having a slot located adjacent to said plate, a pin connected with the plate and passing through the slot, a nut on said pin, said nut being adapted to secure the plate to the slide, a lever for moving said slide transversely of the arm, and means mounted above said plate for supporting work below said polishing-wheel, said means comprising a bracket on the plate, a head adjustably mounted on the bracket, a work-spindle adjustably mounted on the head and a housing adjustably mounted on the work-spindle, a casing mounted on said housing, a hollow shaft in the casing, and means connected with said hollow shaft for holding the work.

15. In a work-holder, the combination of a movable housing, a draw-bar mounted thereon, means on the housing for manipulating the draw-bar, a casing on the housing, a hollow shaft in the casing, a draw-bar passing through said hollow shaft, means on said draw-bar for manipulating a chuck, and means for moving the draw-bar.

16. In a work-holder, the combination of a movable housing, a draw-bar mounted thereon, means on the housing for manipulating the draw-bar, a casing on the housing, a hollow shaft in the casing, a draw-bar passing through said hollow shaft, means on said draw-bar for manipulating a chuck, and means for moving the draw-bar, said means comprising a cam slidably mounted with respect to the draw-bar, means for moving the cam, and a lever connected with the draw-bar and operable by the cam.

17. In a work-holder, the combination of a hollow shaft adapted to hold a chuck, a draw-bar passing through said shaft and adapted to operate the chuck, a sliding collar having

a cam-surface, a lever for operating said draw bar, and means connected with said lever for engaging the cam to transmit motion from the cam to the draw-bar.

18. In a work-holder, the combination of a hollow shaft adapted to hold a chuck, a draw-bar passing through said shaft and adapted to operate the chuck, a sliding collar having a cam-surface, a lever for operating said draw-bar, means connected with said lever for engaging the cam to transmit motion from the cam to the draw-bar, and a casing surrounding said lever and cam, said casing being in two parts, one part being stationary and the other movable.

19. In a work-holder, the combination of a hollow shaft adapted to hold a chuck, a draw-bar passing through the shaft and having means for manipulating the chuck, means for moving the draw-bar through the shaft, and means for rotating the shaft, said last-named means comprising a pair of gears, one on said shaft, a driving-shaft connected with the other gear, and means for transmitting motion to the last-named shaft.

20. In a work-holder, the combination of a hollow shaft adapted to hold a chuck, a draw-bar passing through the shaft and having means for manipulating the chuck, means for moving the draw-bar through the shaft, and means for rotating the shaft, said last-named means comprising a pair of gears, one on said shaft, a driving-shaft connected with the other gear, means for transmitting motion to the last-named shaft, a pair of bevel-gears loosely mounted on the last-named shaft, means for rotating said gear and a clutch member mounted on the shaft and adapted to engage either of said gears for transmitting motion to the second shaft in either direction.

21. In a work-holder, the combination of a hollow shaft adapted to hold a chuck, a draw-bar passing through the shaft and having means for manipulating the chuck, means for moving the draw-bar through the shaft, and means for rotating the shaft, said last-named means comprising a pair of gears, one on said shaft, a driving-shaft connected with the other gear, means for transmitting motion to the last-named shaft, an index-plate mounted on the second shaft, a flexible shaft adapted to transmit power to the second shaft, means for disengaging the power, transmitting means connected with the flexible shaft from the second shaft, and a crank adapted to be mounted on the second shaft and having a pin for engaging said index-plate.

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

IRVING L. POMEROY.

Witnesses:

ADA BARRETT,

WM. A. DICKENSON.