Jan. 2, 1923.

1,440,603.

H. C. HOOK.

PROFILING MACHINE.

FILED OCT. 14, 1920.

4 SHEETS—SHEET 1.

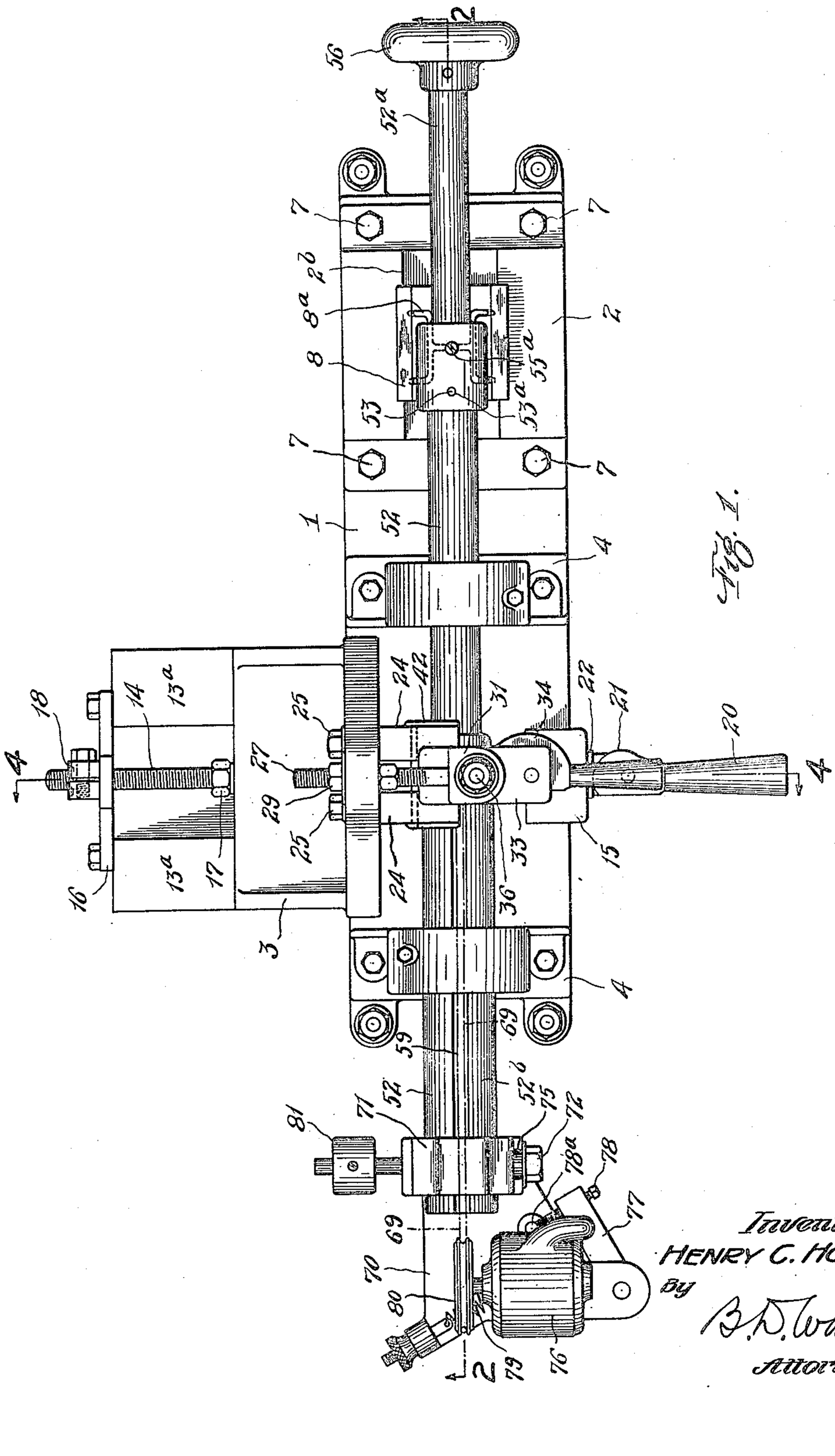

FIG. 1.

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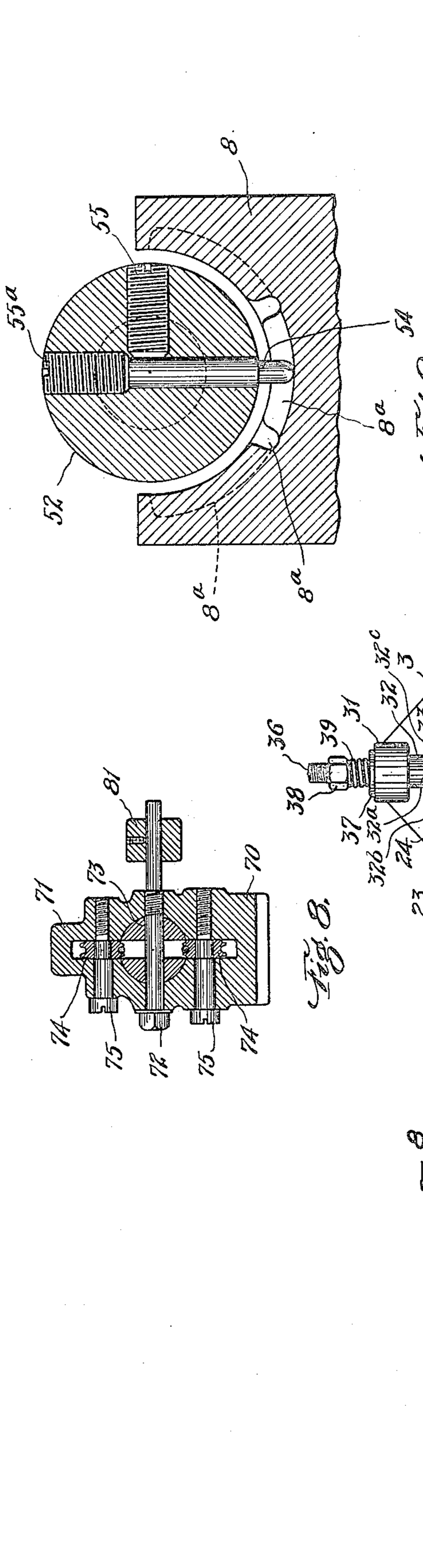

Fig. 9.

Fig. 8.

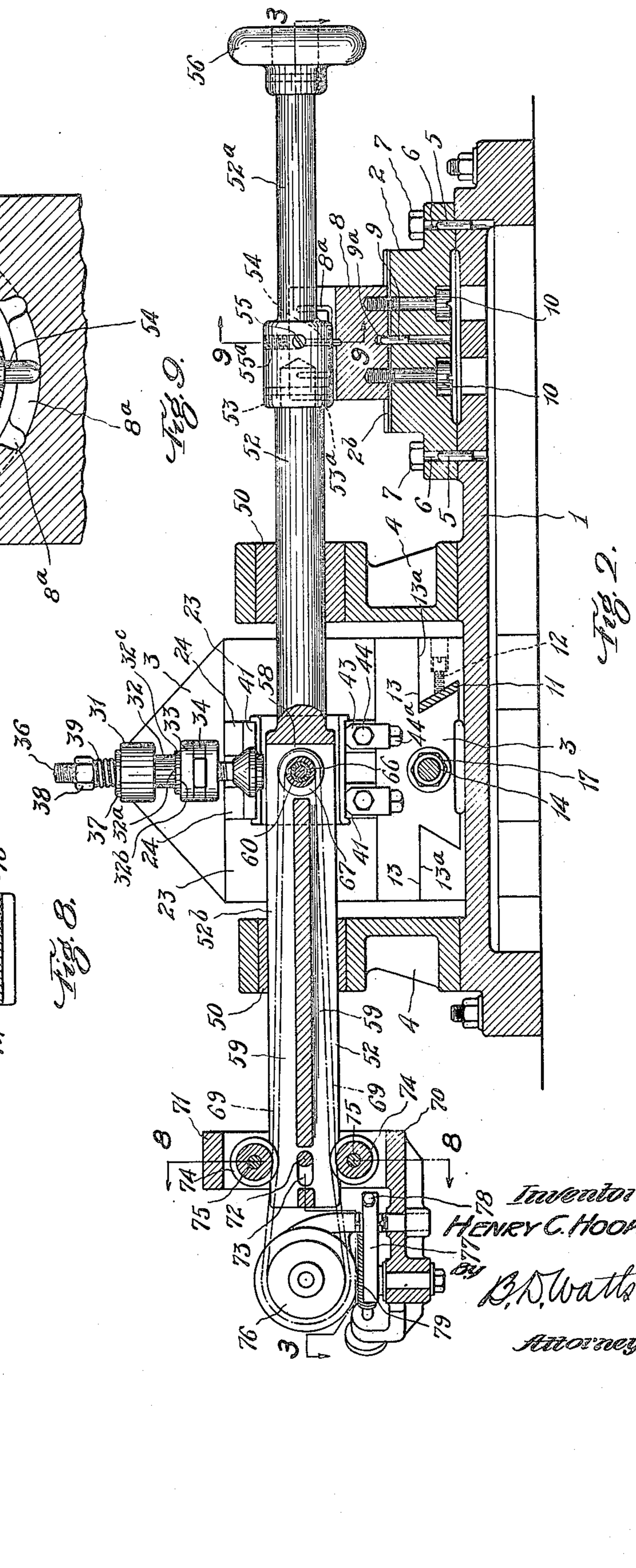

Fig. 2.

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4 SHEETS—SHEET 3.

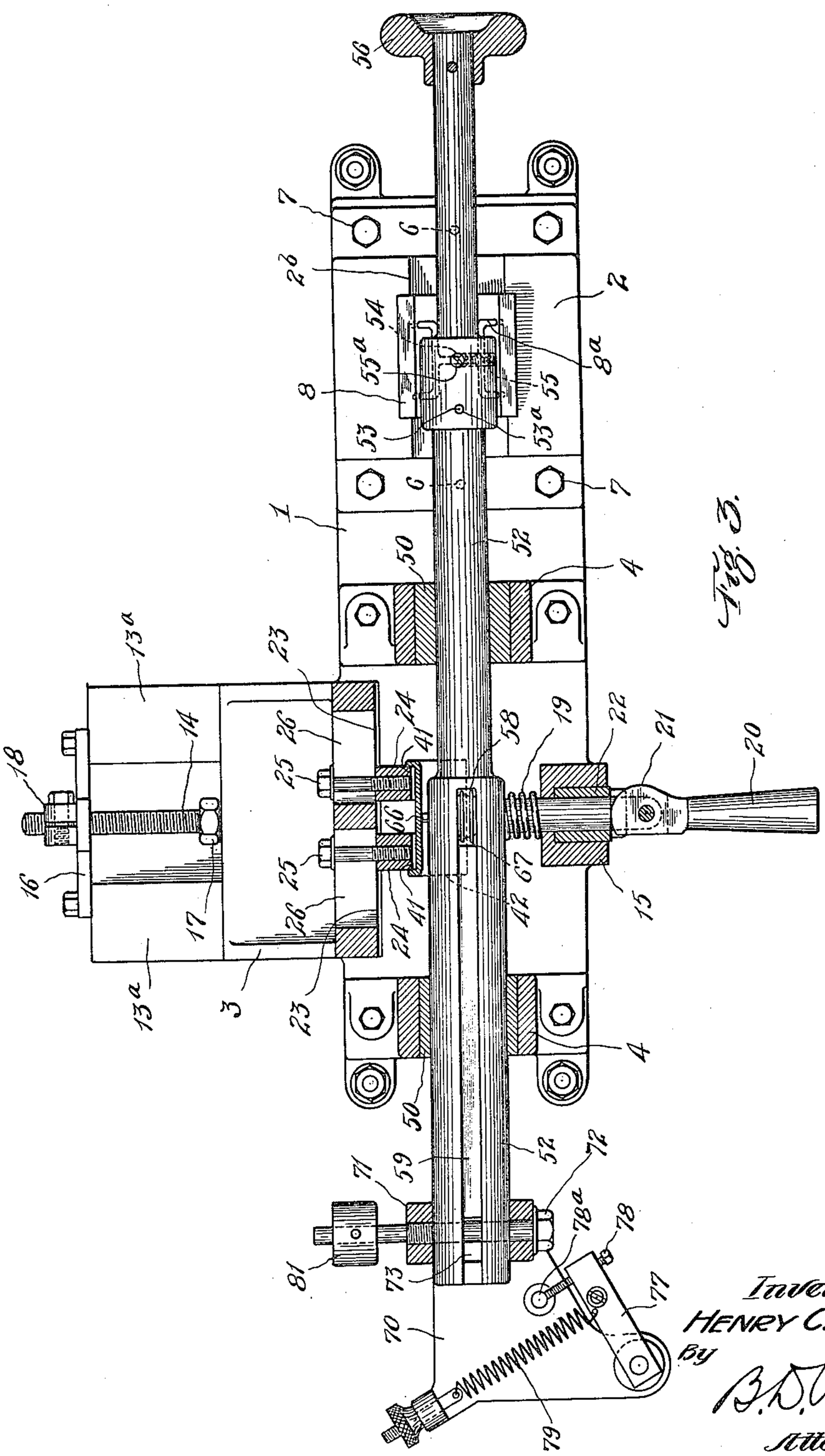

Fig. 3.

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4 SHEETS—SHEET 4.

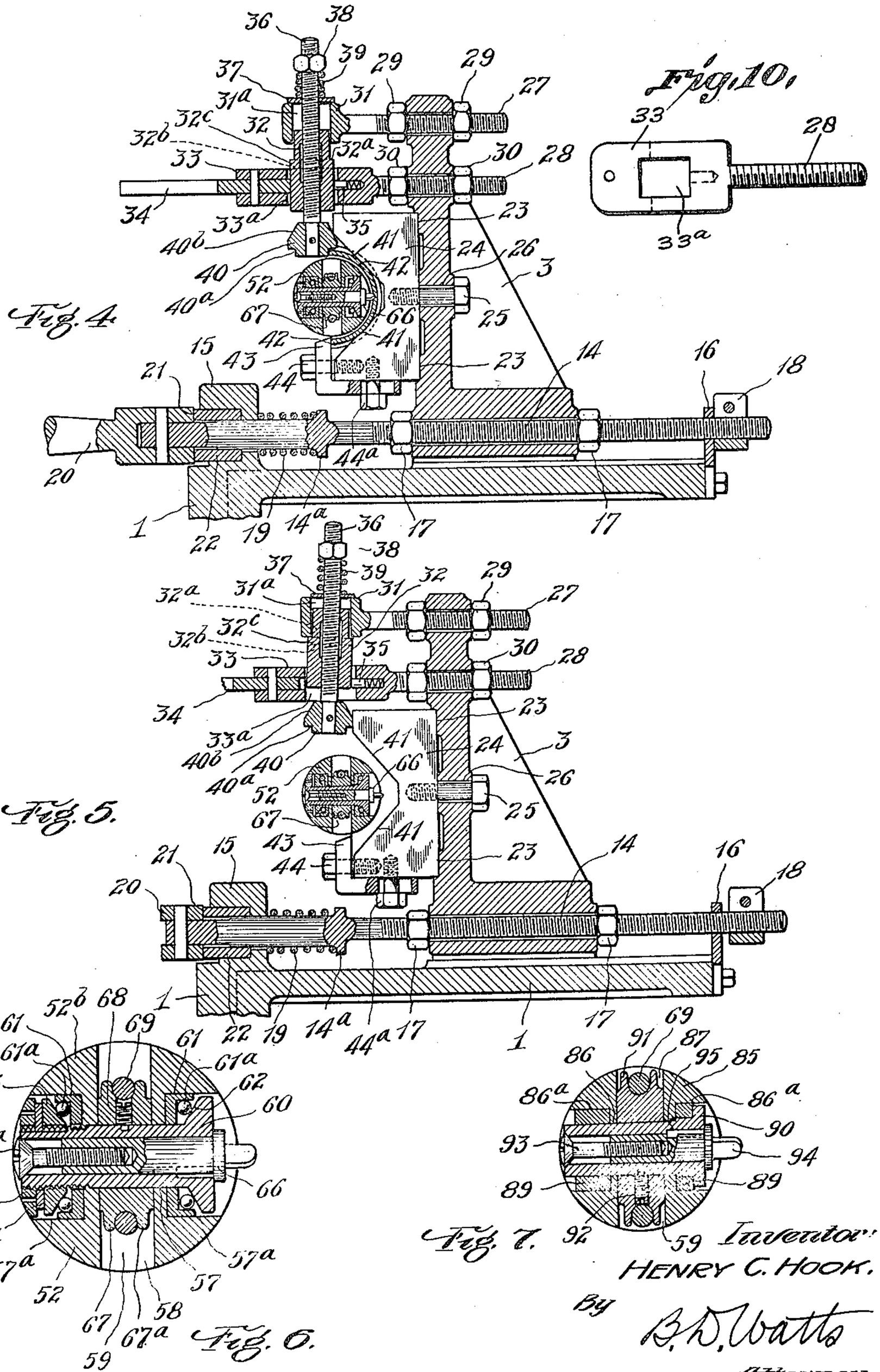

Fig. 4.

Fig. 10.

Fig. 5.

Fig. 6.

Fig. 7.

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Patented Jan. 2, 1923. 1,440,603

UNITED STATES PATENT OFFICE.

HENRY C. HOOK, OF WINDSOR, VERMONT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ALUMINUM MANUFACTURES, INCORPORATED, OF CLEVELAND, OHIO, A CORPORATION OF DELAWARE.

PROFILING MACHINE.

Application filed October 14, 1920. Serial No. 416,396.

To all whom it may concern:

Be it known that I, HENRY C. HOOK, a citizen of the United States, residing at Windsor, county of Windsor, State of Vermont, have invented a certain new and useful Improvement in Profiling Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to profiling machines of the class adapted to remove portions of the surfaces of solid objects. It relates especially to a machine for forming oil grooves of any desired configuration on the inner surface of substantially semicylindrical bearings.

One object of the invention is to construct a profiling machine which will reproduce the surface reliefs or elevations and depressions of a master object on the surface of a work blank.

Another object of the invention is tc construct a simple, improved machine for accurately reproducing the surface grooves of a master plate on the surface of work blanks.

Another object of the invention is to construct an improved machine for accurately, quickly and cheaply forming grooves of various configurations in the inner surface of substantially semicylindrical bearings.

Another object is to construct an improved profiling machine for forming grooves in the inner surfaces of substantially semicylindrical bearings of various sizes.

Another object is to construct an improved profiling machine for forming depressions in the inner surface of semicylindrical objects of relatively small diameters.

Another object is to devise a new and improved means of mounting and actuating the cutting tool of a profiling machine of the class described.

Another object is to devise a new and improved means for mounting and connecting a source of power with the cutting tool of a profiling machine of the class described.

Other objects more or less intimately related to these objects will be pointed out in the following specification.

To disclose my invention so that it may be easily understood by those skilled in the art, I have chosen to describe in detail a specific form of machine made in accordance with the principles of my invention and to illustrate the various parts of this machine in the accompanying drawings which constitute a part of this specification and in which,

Fig. 1 is a top plan view of a complete machine adapted to form grooves on the inner surface of semicylindrical bearings.

Fig. 2 is a side elevation, partly in section, taken on line 2—2 Fig. 1.

Fig. 3 is a plan view partly in section taken on line 3—3 of Fig. 2.

Fig. 4 is an end elevation, in section, taken on line 4—4 Fig. 1 showing the machine assembled for cutting.

Fig. 5 is a view similar to Fig. 4 but with the blank holding mechanism retracted and the blank removed.

Fig. 6 is an enlarged detail view of the cutter and its mounting shown in Figs. 4 and 5.

Fig. 7 is a similar view of a modified form of cutter mounting for small bearing blanks.

Fig. 8 is a sectional view, taken on line 8—8 Fig. 2 looking in the directions of the arrows.

Fig. 9 is an enlarged section taken on line 9—9 Fig. 2 showing details of the tracing pointer.

Fig. 10 shows in plan view a rod with an eye head and eye 33^a forming part of the blank holding device.

The base 1 which may be secured to a table, bench or other suitable supporting means (not shown) carries on its upper surface a block 2, a cross slide 3, and two vertical brackets 4.

The block 2 is accurately positioned on base 1 by dowel pins 5 which extend into holes 6 in the block, and is secured in position by bolts 7. A master block 8 seats on the upper surface of block 2, being accurately positioned relative to block 2 and the other parts of the machine by registering dowel pin 9 and hole 9^a, and a groove 2^b in which a portion of block 8 has a close fit. Screws 10 pass through block 2 and hold block 8 in place. The master block 8 has its upper surface shaped and grooved or otherwise formed to conform to the shape and configuration desired in the finished work blanks which in this particular machine are semicylindrical bearings. For

instance any configuration of groove 8ª desired in the finished bearing is formed in the surface of the master blank. It will of course be understood that the master blank 8 is not interchangeable with all bearings and must be replaced by suitably formed blocks whenever bearings of different sizes or shapes or having different forms of oil grooves are desired.

Between brackets 4, a cross slide 3 has a sliding dove-tail connection with base 1, wear between the slide and base being taken up by a gib 11 and adjusting screws 12. The slide 3 is provided with a broad, wide base portion having an accurately machined bearing surface 13 seating upon a similar surface 13ª on the base upon which surface it may be freely moved forward or backward. A threaded rod 14 passes thru an upright 15 on base 1, the base portion of slide 3 and a stop plate 16 attached to the rear of base 1. Nuts 17 serve to adjust the position of slide 3 relative to the rod 14, while an adjustable stop 18 limits the forward movement of rod 14. The rod 14 with the slide 3 secured to it between nuts 17 may conveniently be given rearward movement relative to base 1 by a spring 19 encircling the rod 14 between a shoulder 14ª, formed thereon and the extension 15, while the rod may be given forward movement by a lever 20 pivoted to the forward end of rod 14 and having a cam surface 21 to engage a suitable bushing 22 which is seated in extension 15.

The vertical portion of slide 3 is provided with machined bearing surfaces 23 to receive blank adaptors 24 which are slidably secured to the vertical portion 3 by screws 25 passing thru slots 26. Near the upper extremity, of slide 3 two screw threaded rods 27 and 28 pass thru holes in the slide and are adjustably located by nuts 29 and 30 respectively. Rod 27 has an eye head 31 and eye 31ª in which a bushing 32 has a loose fit. The rod 28 has an eye head 33 with an elongated eye 33ª, and a cam lever 34 pivoted in the forward end of the head. The eye 33ª is slightly larger than the outer dimensions of bushing 32 to permit free movement of the bushing therein. The cam surface of lever 34 is adapted to engage the bushing 32 and force it rearwardly thus causing a binding contact of head 40 against the work blank and a clamping of the bushing relative to head 31. To assist in returning bushing 32 to its normal position when cam lever 34 is released, a spring pressed plunger 35 is mounted in the head 33 as shown in Fig. 4.

Bushing 32 is bored centrally and threaded interiorly for engagement with a threaded rod 36 which extends thru the bushing and stop plate 37. Between this plate or washer and a nut 38, a spring 39 is compressed to retract rod 36 and bushing 32 when the latter is freed from the retaining face of cam lever 34. Movement of the bushing 32 in eyes 31ª and 33ª is limited by shoulders 32ª and 32ᵇ respectively formed on the outer surface of the bushing by ribs 32ᶜ indicated by dotted lines in Figs. 4 and 5. At the lower end of rod 36 I secure a detachable head 40 having a rabbeted or otherwise suitably formed end 40ª to engage the edge of a bushing and retain it in place in the adapters 24. The head also has a tapered end 40ᵇ designed to permit the head to fit between the two adaptors when they are drawn close together as in accommodating short work blanks. Furthermore when the adaptors are suitably spaced apart and the rod 36 is so adjusted in the bushing 32 as to bring the tapered surface 40ᵇ of the head 40 in contact with the inclined surfaces or edges of the adaptors 24 when the cam lever 34 is released, actuation of the head 40 becomes semiautomatic. As the cam lever 34 presses against bushing 32 the force is transmitted by rod 36 to head 40, causing the surface 40ᵇ to slide along the adjacent surfaces of adaptors 24, thus moving head 40 into engagement with a work blank semiautomatically or without manual operation except thru the cam lever.

The work blank adaptors 24 are relatively thin blocks or plates with substantially V shaped edges 41 suitable for supporting semicylindrical work blanks, preferably mounted in pairs on surfaces 23, and by being adjusted laterally thereon with screws 25 may accommodate blanks of various lengths. A work blank or semicylindrical bearing 42 may be secured in position on edges 41 by adjustable gauges 43 and head 40 of rod 36, the gauges 43 being attached to adaptors 24 by screws 44 and 44ª, as shown.

The vertical uprights 4 are horizontally bored and provided with bushings 50 thru which a shaft 52 is slidably and rotatably mounted. This shaft may be made in one or several parts but conveniently consists of two parts 52ª and 52ᵇ united by a thru pin 53 in pin hole 53ª. Adjacent master block 8 shaft 52ª is diametrically bored to receive a tracing pointer 54 which is adjustably secured therein by screws 55 and 55ª to register with grooves 8ª formed in the master block. A hand grip 56 of wood, or other suitable material may be fastened to the free end of rod 52ª for easy manipulation of rod 52.

At a point which is between the uprights when the shaft is in its normal position, 52ᵇ is provided with a diametrical circular bore 57, having enlarged ends 57ª. At right angles to bore 57, a substantially rectangular diametrical slot 58 is formed. Grooves 59 extend from slot 58 to the free end of shaft 52ᵇ.

A spindle 60 is rotatably mounted in bore

57. Antifriction means cooperating with spindle 60 may consist of bearings, comprising a race 61 located in each opening 57[a] and balls 61[a] interposed between the races and a shoulder 62 at one end of spindle 60, and a tapered nut 63 suitably secured at the other end thereof. A washer 64 and a nut 65 serve to retain the spindle and its antifriction means in position in the shaft 52.

Within the bore of spindle 60, an end milling cutter 66 or other suitable cutting tool may be keyed or otherwise secured to the spindle for rotation therewith and held in assembled position in the spindle by screw 66[a] or other means. It will be understood that various types and sizes of cutters may be employed, as desired for different sized blanks or bearings and grooves.

In assembling spindle 60, the shank is passed thru the bore of a pulley 67 having a grooved outer surface 67[a] located in slot 58. The pulley may be secured to the spindle 60 as by a set screw 68 or in any other suitable manner. By means of a belt 69 running in grooves 59 and connecting the pulley with a source of power later to be described, the cutter is rotated and caused to cut the surface of work blanks brought into engagement therewith.

A source of power for the cutter may conveniently be carried by the free end of rod 52[b]. As is shown, a flat base member 70 has an upright 71 bored to receive the end of rod 52 to which it is secured by a pin 72 passing thru the upright 71 and a slot 73 near the end of rod 52. Grooved face pulleys 74 are mounted on pins 75 in upright 71 so as to run within grooves 59 in rod 52 and to engage with belt 69.

A source of power, such as an electric motor 76, is mounted on an arm 77 which has pivotal engagement with base 70. A stop screw 78 and post 78[a], and a spring 79 serve to adjust and maintain the arm 77 in any desired position. A grooved pulley 80 is attached to the rotating axle of the the motor and carries the belt 69, which serves to transmit rotational motion of the motor to the cutting tool 66.

To counter balance the weight of the motor 76, base 70, and other parts which may project on one side of rod 52, a counterweight 81 may be adjustably attached to the extended end of rod 72 on the side of rod 52 opposite such parts.

In using the above described machine to form oil grooves on the inner surface of semicylindrical bearings, the apparatus is assembled as shown in the drawings. A master block 8 having an upper curved surface substantially the same as regards size, shape and grooves, as is desired in the finished bushing, is mounted where it will be in exact alignment with the shaft 52. The tracing pointer 54 is adjusted to engage the groove 8[a] in the block and is then locked in position by screws 55 and 55[a]. Next a bearing 42 is placed in the V shaped recesses 41 of adaptors 24 and guages 43 adjusted to accurately position the bearing. The head 40 is then pulled down to engage the edge of the bearing opposite the guages 43 by adjusting rod 36, nut 38, and bushing 32, and is clamped in position by cam lever 34 pressing on bushing 32.

The bearing having been thus secured in the adaptors, the slide is adjusted on rod 14 so that when cam lever 20 is moved to clamping position, the bearing will be brought into working position relative to shaft 52 and cutter 66. A cutter 66 of the desired size is secured in spindle 60. The belt 69 is assembled with pulley 67 on spindle 60, pulley 80 of motor 76, and pulleys 74 of upright 71. After arm 77 which bears the motor is properly located with respect to base 70 so as to properly align pulley 80 with pulleys 74 and 67 and to give belt 69 the desired tension the apparatus is ready for operation.

Electrical energy is supplied to motor 76 and the rotational movement thereof transmitted to cutter 66.

The slide 3 is moved forward and locked in the predetermined position which brings the cutter 66 into engagement with bearing 42. By manually sliding and rotating rod 52 and thus causing pointer 54 to follow grooves 8[a] in the master block, corresponding grooves will be traced out and cut on the bearing 42 by cutter 66.

It will be noted that rod 52 is free to rotate in bushing 50 while the belt 69 is moving, due to the location of the belt within the circumference of the rod 52. Furthermore since the motor is mounted for movement with shaft 52, it transmits its rotational motion to the cutter 66 equally well in all positions of the shaft 52 and regardless of the movement of the rod.

After the grooving has been completed and slide 3 retracted by spring 19, the finished bearing may be removed from adaptors 24 by releasing cam lever 34 and retracting rod 36 and head 40 after which another bearing may be inserted and the operations repeated.

With bearings having internal diameters of two inches or more the cutter mounting described above may be employed but when smaller bearings constitute the work blanks, a modified cutter mounting is preferred. Such a mounting is detailed in Fig. 7. Here is shown a smaller rod 85 with a bore 86 and slot 87 and having bearings 89 seated in enlargements 86[a] of bore 86. A spindle 90 turns on bearings 89, being held in position by pulley 91 secured thereto by a set screw 92. A screw 93 holds a cutting tool 94 in place in spindle 90 while a key and keyway

95 prevent rotation of cutter 94 relative to spindle 90. Grooves similar to grooves 59, Fig. 2, extend from pulley 91 to the end of shaft 85.

It will be understood that for small bearings a small shaft, a cutter and cutter mountings are needed, and that these parts should be enlarged somewhat when bearings of large sizes are to be accommodated. It is not necessary however, to have many different sized shafts and other parts since the manner of aligning and mounting the shafts and blanks makes possible the adaptation of one shaft to many different sized bearings. By referring to Fig. 4, it will be noted that the center line of rod 52 coincides with the center line of the curved inner surface of bearing 42. With all parts of the inner surface equidistant from the center of the rod 52, the center is adpated to form grooves of uniform depth in any portion of the bearing surface. When a larger or smaller bearing is to be grooved it is placed on the V-shaped edges of the adaptors and the slide 3 is adjusted on rod 14 so that the center of curvature of the bearing surface coincides with the center of the shaft, when the slide is clamped in working position.

It is necessary, however, to use a cutter having a cutting head and shank of sufficient length to engage the bearing blank and to form grooves or depressions of the desired depth and size therein. With the exception of this one replaceable unit the apparatus is equipped to form grooves of uniform depth in bearings of many different sizes.

While I have described in detail the various parts of a specific apparatus embodying the principles of my invention, and one class of work of which it is capable I do not wish to be limited thereto, since many modifications of various parts of the described apparatus as well as of the type of work it is capable of performing can be made without departure from the scope of the invention as defined in what is claimed.

What I claim is:

1. In a profiling machine for forming depressions in the surface of an article, a base, a master block mounted on the base having depressions in its surface, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage a surface of a work blank, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

2. In a profiling machine for forming depressions in the surface of an article, a base having uprights, a master block mounted on the base and having depressions in its upper surface, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported in the uprights and having a pointer adapted to move in and be guided by the depressions in the master block, the shaft also having a cutter adapted to engage a surface of the work blank and to reproduce therein the depressions of the master blank when the said shaft is guided thereby, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

3. In a profiling machine for forming depressions in the surface of an article, a base, a semicylindrical master block mounted on the base and having depressions in its surface, a cross slide movably mounted on the base, and adapted to carry a semicylindrical work blank, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage the inner surface of a work blank, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

4. In a profiling machine for forming depressions in the surface of an article, a base, a semicylindrical master block mounted on the base and having depressions in its inner surface, a cross slide movably mounted in the base, and adapted to carry a semicylindrical work blank, a shaft movably supported by the base and having a pointer adapted to move in and be guided by the depressions in the master block, the shaft also having a cutter adapted to engage the inner surface of a work blank and to reproduce therein the depressions of the master block when the shaft is guided thereby, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the inner surface of the said work blank.

5. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft supported by the base for rotational and lateral movement relative thereto, a cutter rotatably mounted in the shaft and at right angles to the length thereof to engage a work blank, and means mounted on and movable with the shaft for rotating the cutter.

6. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft supported by the base for rotational and lateral movement relative thereto, a cutter rotatably mounted in the shaft and at an angle to the length thereof to engage a work blank, power means mounted on and mov-

able with the said shaft and means connecting the power means with the cutter and passing within the outer circumference of the shaft.

7. In a profiling machine for forming depressions in the surface of an article, a base having two uprights and a cross slide guide located there between, a master block mounted on the base and having depressions in its surface, a cross slide mounted on the said guide and adapted to hold a work blank, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage a surface of the work blank, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

8. In a profiling machine for forming depressions in the surface of an article, a base having two uprights and a cross slide guide located therebetween, a master block mounted on the base and having depressions in its surface, a cross slide mounted on the said guide and adaptors carried thereby for holding a work blank, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage a surface of the work blank, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

9. In a profiling machine for forming depressions in the surface of an article, a base having two uprights and a cross slide guide located therebetween, a master block mounted on the base having depressions in its surface, a cross slide mounted on the said guide an adaptor carried thereby for seating a work blank and adjustable means carried by the cross slide for securing a work blank in the adaptor, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage a surface of the work blank, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

10. In a profiling machine for forming depressions in the surface of an article, a base; a master block mounted on the base and having depressions in its surface, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and having a pointer engaging the depressions in the master block and also having a cutter adapted to engage a surface of the work blank, the said cutter having its shank rotatably secured within the circumference of the shaft, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

11. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and having a cutter adapted to engage a surface of a work blank, the shank of the cutter being rotatably mounted within the circumference of the shaft and being connected to and actuated by means also located within the circumference of the shaft, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

12. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carrying a work blank. a shaft movably supported by the base and having a rotatable cutter extending at an angle to the longitudinal center line of the shaft, said cutter being adapted to engage a surface of a work blank, the shank of the cutter and its mounting being located within the circumference of the said shaft, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation on the surface of the said work blank.

13. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and having recesses, means mounted in certain of the recesses for rotatably securing a cutting tool and means operable in certain of the recesses for rotating the said cutting tool, and means mounted on and movable with the said shaft for actuating the cutter to perform a cutting operation in the surface of the said work blank.

14. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and having recesses, a cutting tool rotatably mounted in certain of the said recesses to engage the work blank, power means mounted on and movable with the said shaft and means connecting the power means and the cutting tool and movable in certain of the said recesses for transmitting rotational movement of the power means to the cutting tool irrespective of the movement of the shaft.

15. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide movably mounted on the base, and adapted to carry a work blank, a shaft movably supported by the base and

having recesses, a cutting tool rotatably mounted in certain of said recesses to engage a work blank and a motor mounted on and movable with the shaft, and a belt connecting the motor and the cutting tool and movable in certain of the said recesses whereby rotational movement of the motor may cause rotation of the cutting tool irrespective of the movement or position of the said shaft.

16. In a profiling machine for forming depressions in the surface of an article, a base, a cross slide adjustably mounted on the base, an adaptor secured to the cross slide and having a substantially V shaped surface for mounting semicylindrical work blanks of different sizes, the said V shaped surface and cross slide cooperating to adjust the center of curvature of a work blank held thereby to a fixed position, a shaft supported by the base and carrying a rotatable cutting tool for engagement with the inner surface of the said work blank, and means mounted on and movable with the shaft for rotating the said cutting tool.

17. In a machine of the class described in combination, a base having a cross slide guide adjacent one end thereof, brackets secured to the base on either side of the said guide, a shaft longitudinally and rotatably mounted in the said brackets, a cutting tool rotatably mounted in the said shaft between the said brackets and adapted to engage a work blank carried by the said cross slide and means within the shaft for actuating the cutting tool while permitting unrestricted movement of the said shaft.

18. In a machine of the class described in combination, a base, a master block secured thereto adjacent one end, and having depressions in its upper surface, a cross slide guide in the base adjacent the opposite end thereof, a cross slide adapted to carry a work blank and slidably mounted in the said guide, brackets secured to the said base on either side of the guide, a shaft mounted in the said brackets for rotational and longitudinal movement, a cutting tool mounted in the shaft between the said brackets and adapted to engage with a work blank carried by the said cross slide, a tracing pointer carried by the said shaft adjacent the said master block, and means for rotating the said cutting tool in all positions of the said shaft.

19. In a machine of the class described in combination, a base, a shaft movably mounted thereon, a work blank carrying member movable into and out of working position with respect to the said shaft, a cutting tool carried by the shaft and means within the shaft for rotating the said cutting tool in all positions of the said shaft.

20. In a machine of the class described in combination, a base, a shaft movably mounted thereon, a cam operated member slidably secured to the said base, a motor bracket carried by the said shaft, a cutting tool rotatably mounted in the shaft and adapted to engage a work blank carried by the said cam operated member, a motor mounted on the said motor bracket and means for transmitting rotational movement from the motor to the said cutting tool while permitting unrestricted movement of the said shaft.

21. In a machine of the class described in combination, a base, a shaft mounted thereon for longitudinal and rotational movement, a cutting tool rotatably mounted in the said shaft, and power means connected to the said cutting tool by means located within the shaft and adapted to actuate the said cutting tool without restricting movement of the said shaft.

22. A machine comprising in combination, a base, a shaft mounted thereon for rotational and longitudinal movement, a cutting tool projecting from the side thereof, power means for rotating the said cutting tool without restricting movement of the said shaft and a counter weight adjacent one end of the said shaft for automatically returning the shaft to a predetermined position.

23. In a device of the class described, a base, a manually operable shaft mounted thereon for longitudinal and rotational movement, a tracing pointer carried by the shaft and adapted to engage a master block, a rotatable cutting tool carried by the shaft and adapted to engage a work blank and means for rotating the said cutting tool in all positions of the said shaft while the cutting tool is in engagement with the said blank.

24. In a device of the class described in combination, a base, a shaft movably mounted thereon, a rotatable cutting tool projecting from one side of the said shaft, means carried by the shaft for rotating the said cutting tool, a member slidably mounted on the said base and adapted to receive the work blank on the said member, and means for moving the said member to bring the work blank into engagement with the said cutting tool.

25. In a device of the class described in combination, brackets having aligned openings, a shaft movably mounted therein, a transverse bore in the said shaft, a cutting tool rotatably mounted in the said bore, grooves extending from the said bore to one end of the said shaft and means for rotating the said cutting tool comprising a motor mounted on the said shaft adjacent the open ends of the said grooves and a belt connecting the motor to the cutting tool and adapted to move within the said grooves.

26. In a device of the class described in combination, a shaft mounted for unrestricted, longitudinal and rotational movement, a bore extending transversely through the said shaft, a cutting tool rotatably

mounted in the said bore, longitudinal grooves in opposite sides of the said shaft extending from the said bore to one end of the shaft, a pulley secured to the said cutting tool and aligned with the said grooves, a motor secured to the shaft, and a belt adapted to connect the said motor with the said pulley and to lie within the said grooves.

27. In a device of the class described, in combination, a shaft mounted for endwise and rotational movement, a transverse bore in the shaft, opposite grooves extending from adjacent one end of the said shaft to the said bore, a cutting tool rotatably mounted in the said bore and having a pulley secured thereto in alignment with the said grooves, a bracket mounted on the shaft and having pulleys in alignment with said grooves, a power mechanism mounted on the said bracket and a belt connecting the said mechanism and the said cutting tool pulley and engaging the pulleys in the said bracket, whereby the said belt lies within the said grooves from adjacent one end of the shaft to the cutting tool.

In testimony whereof, I hereunto affix my signature.

HENRY C. HOOK.