C. E. HOOD.

HEEL BURNISHING MACHINE.

APPLICATION FILED MAY 2, 1906. RENEWED MAR. 2, 1910.

957,958.

Patented May 17, 1910.

8 SHEETS—SHEET 1.

Fig. 1.

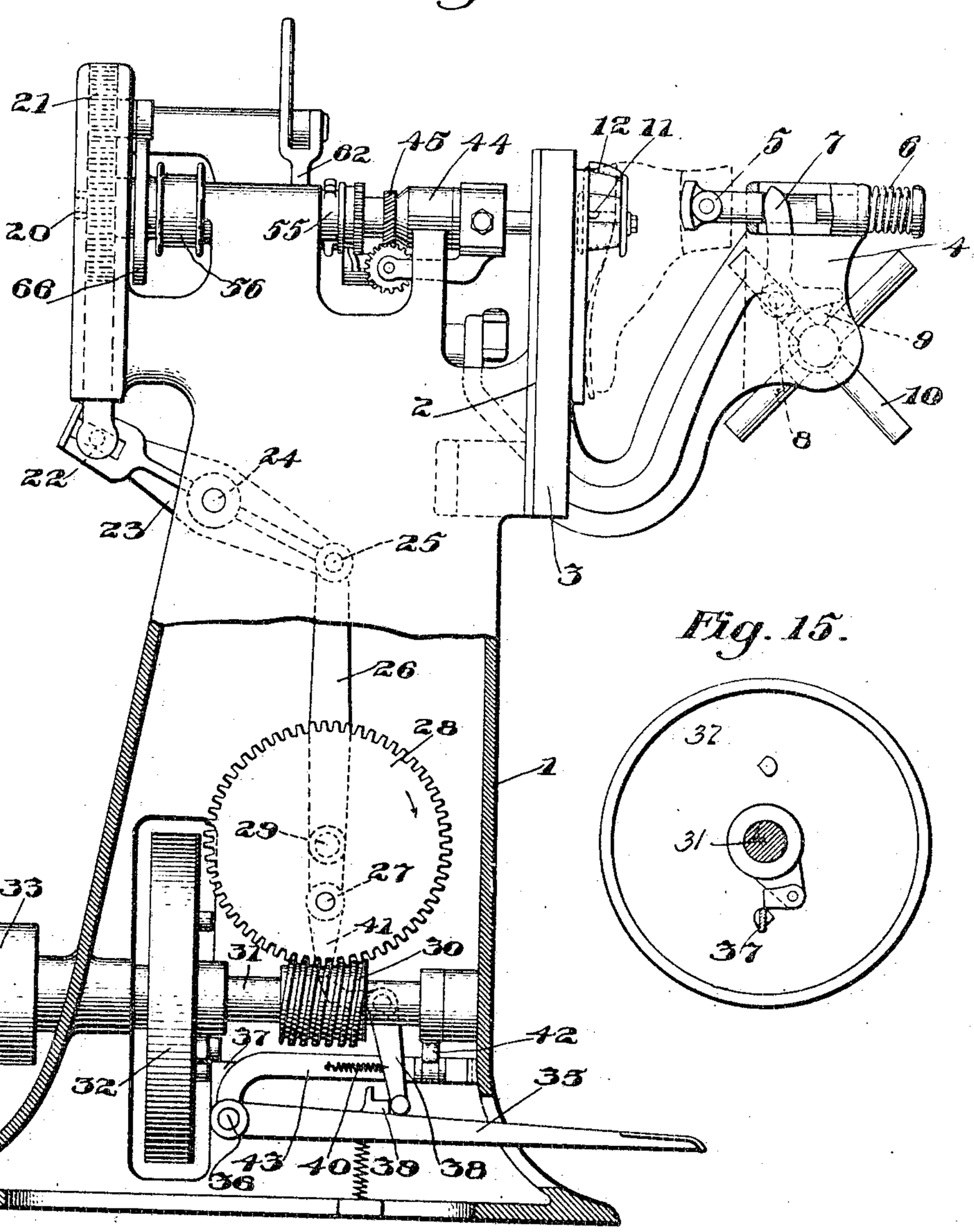

Fig. 15.

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Fig 3

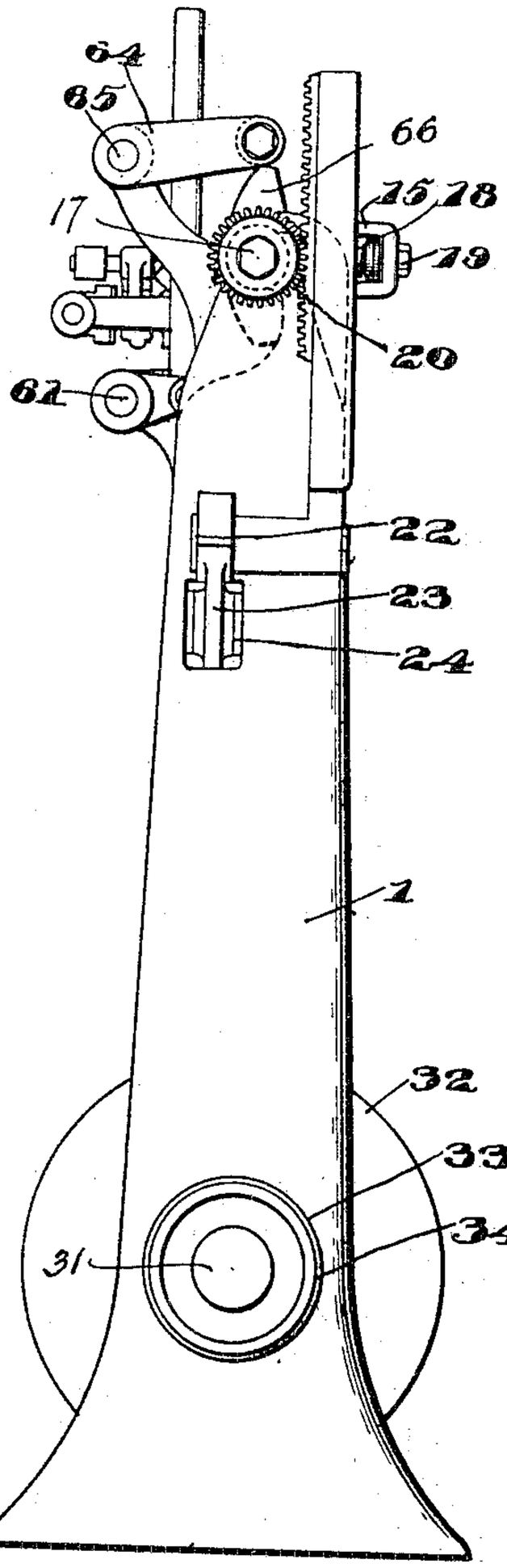

Fig 2

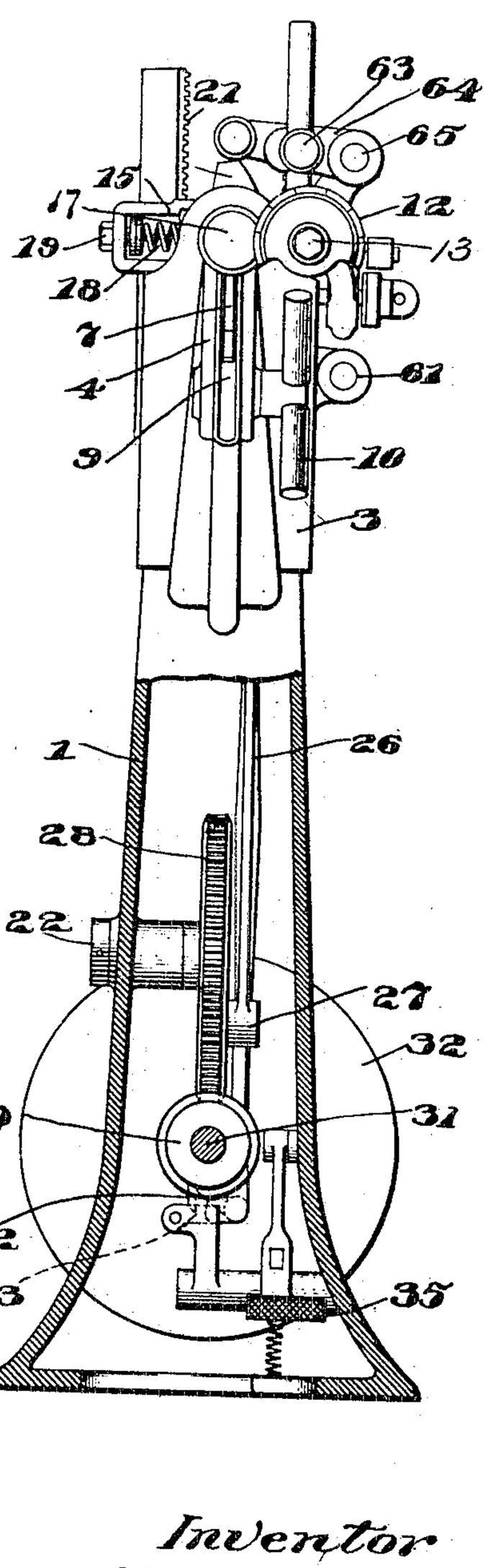

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Fig. 4.

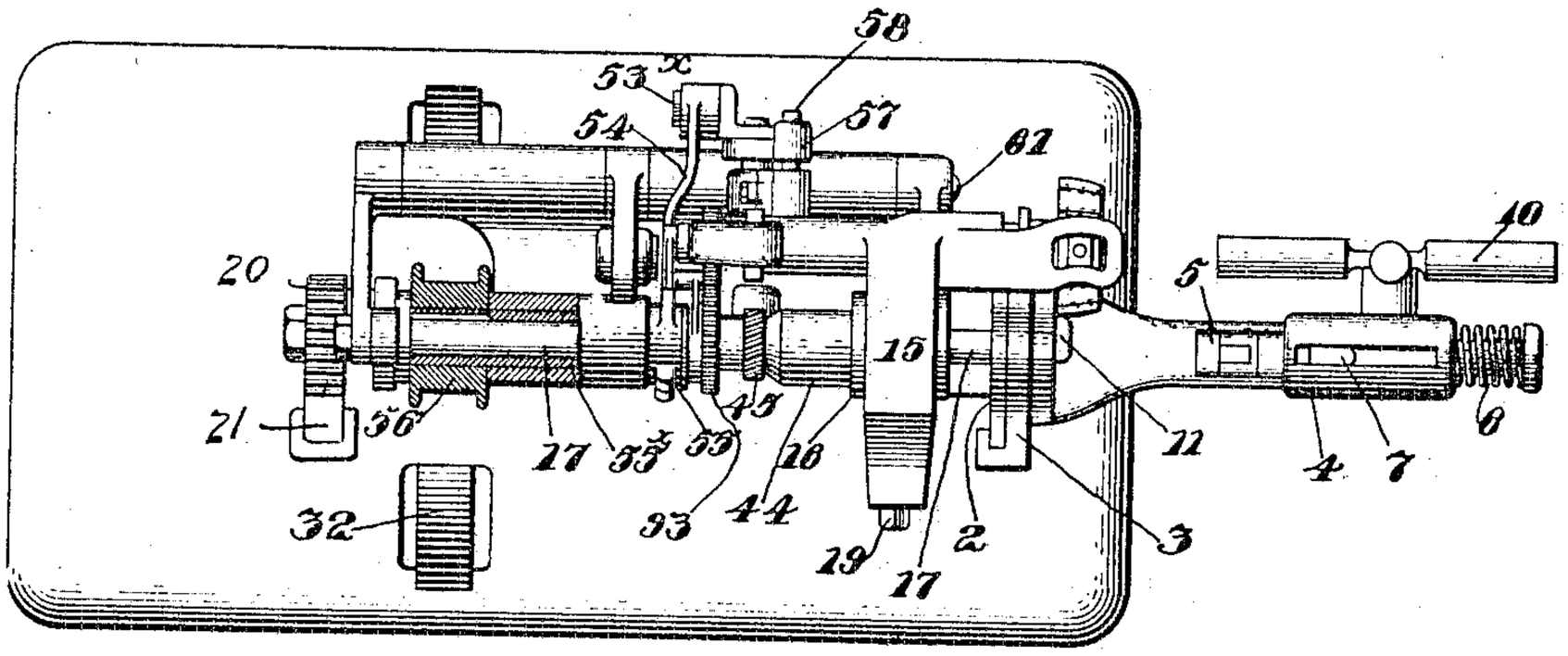
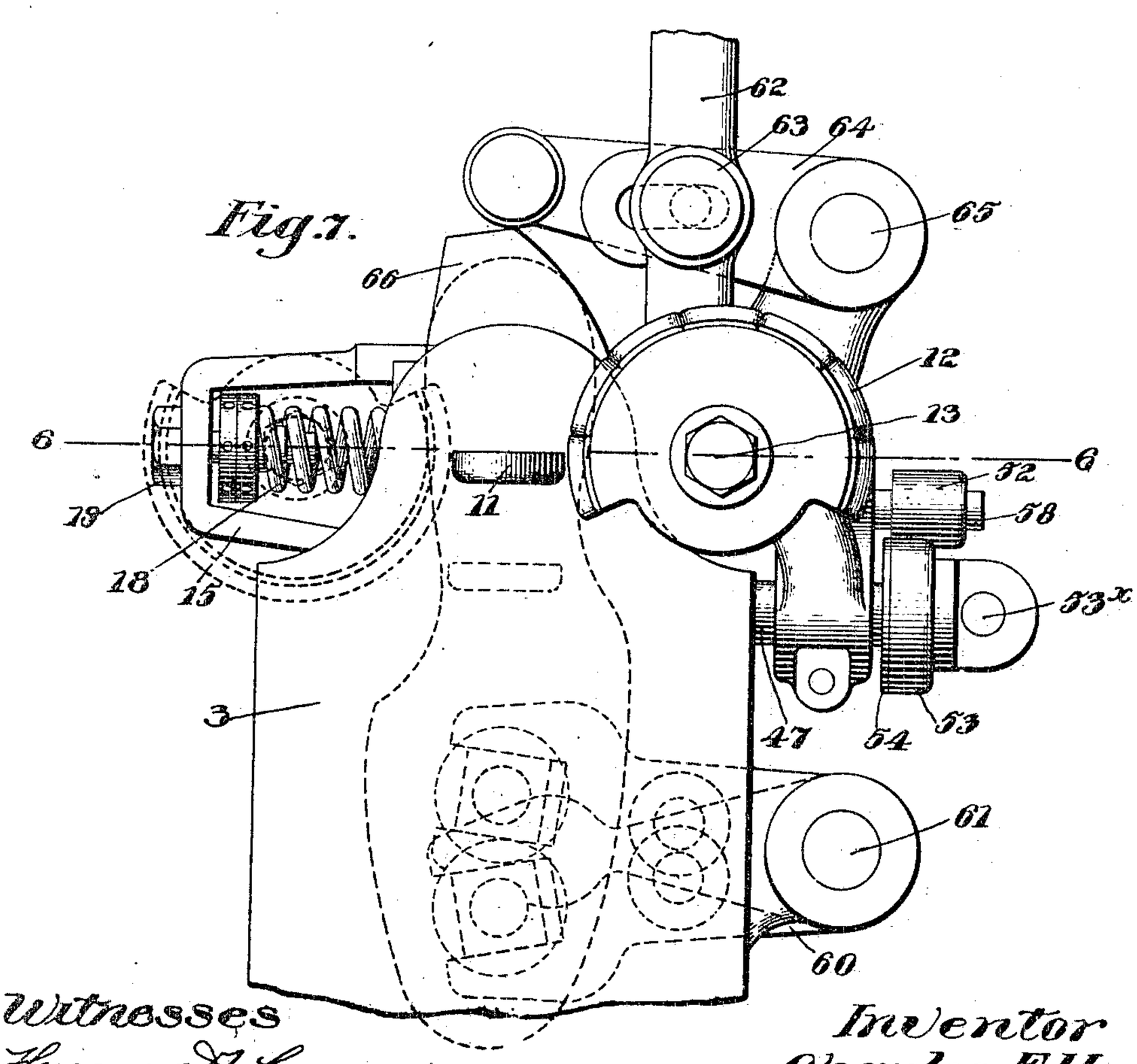


Fig. 7.



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8 SHEETS—SHEET 4.

Fig. 5

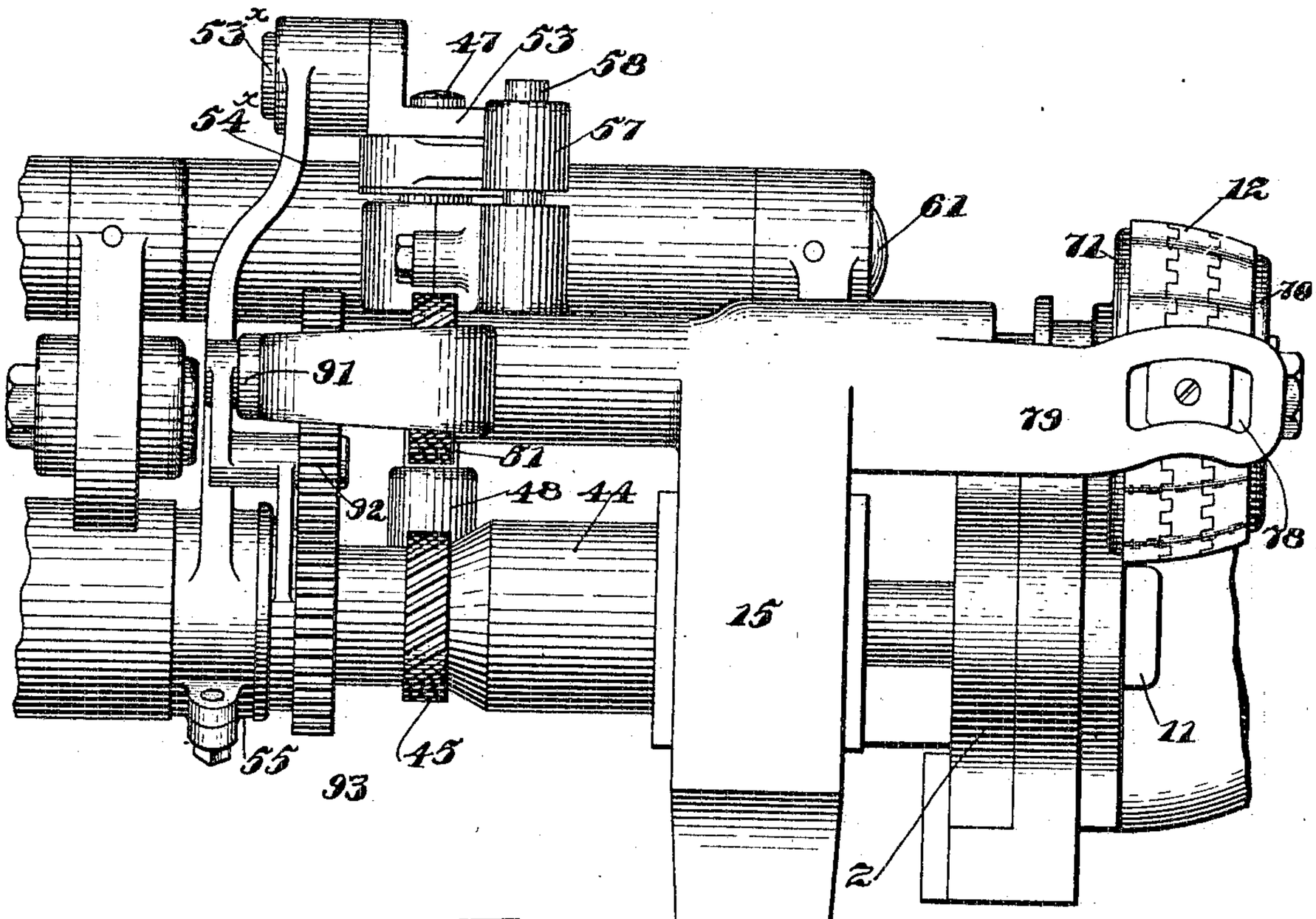

Fig. 6

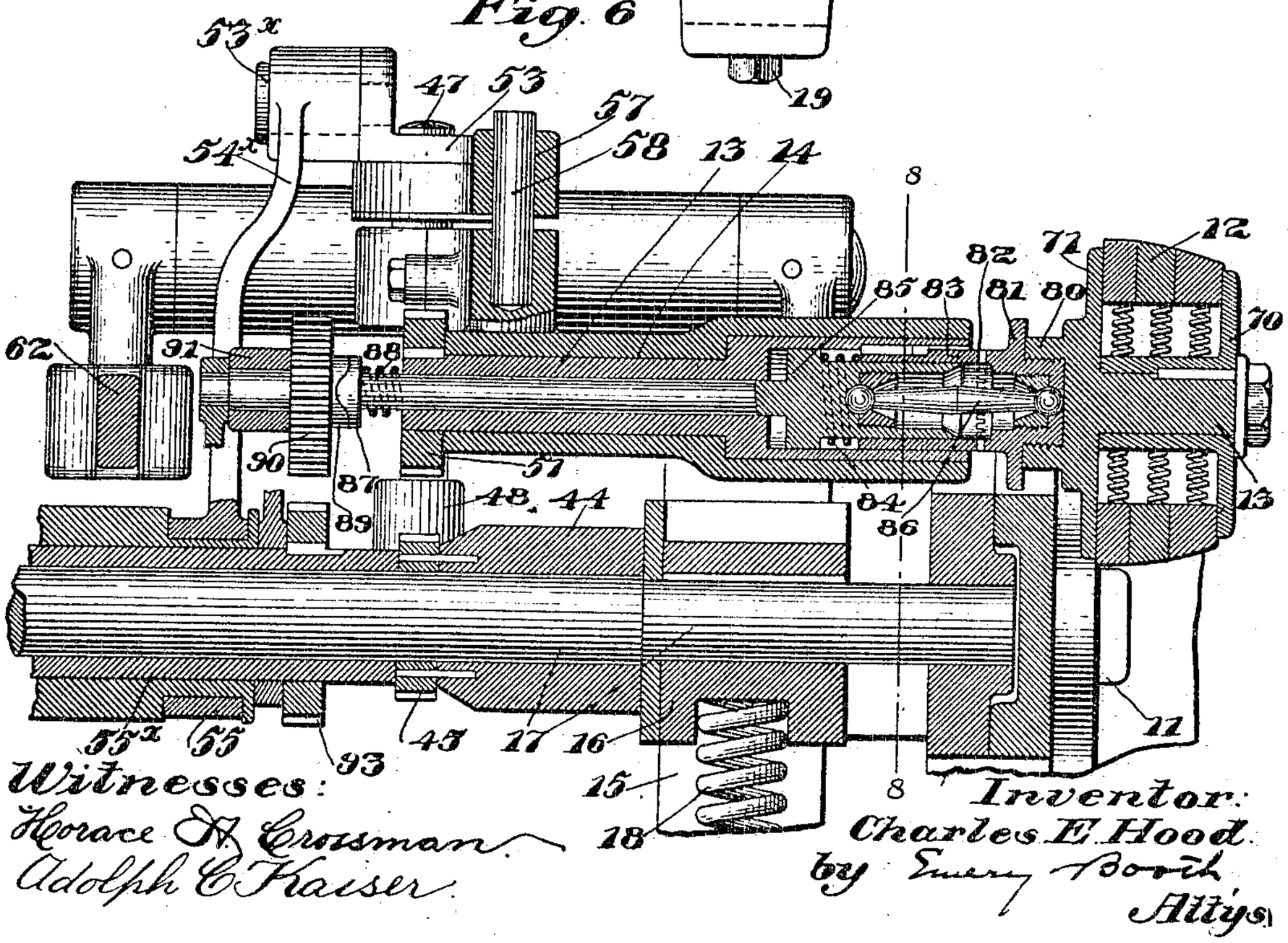

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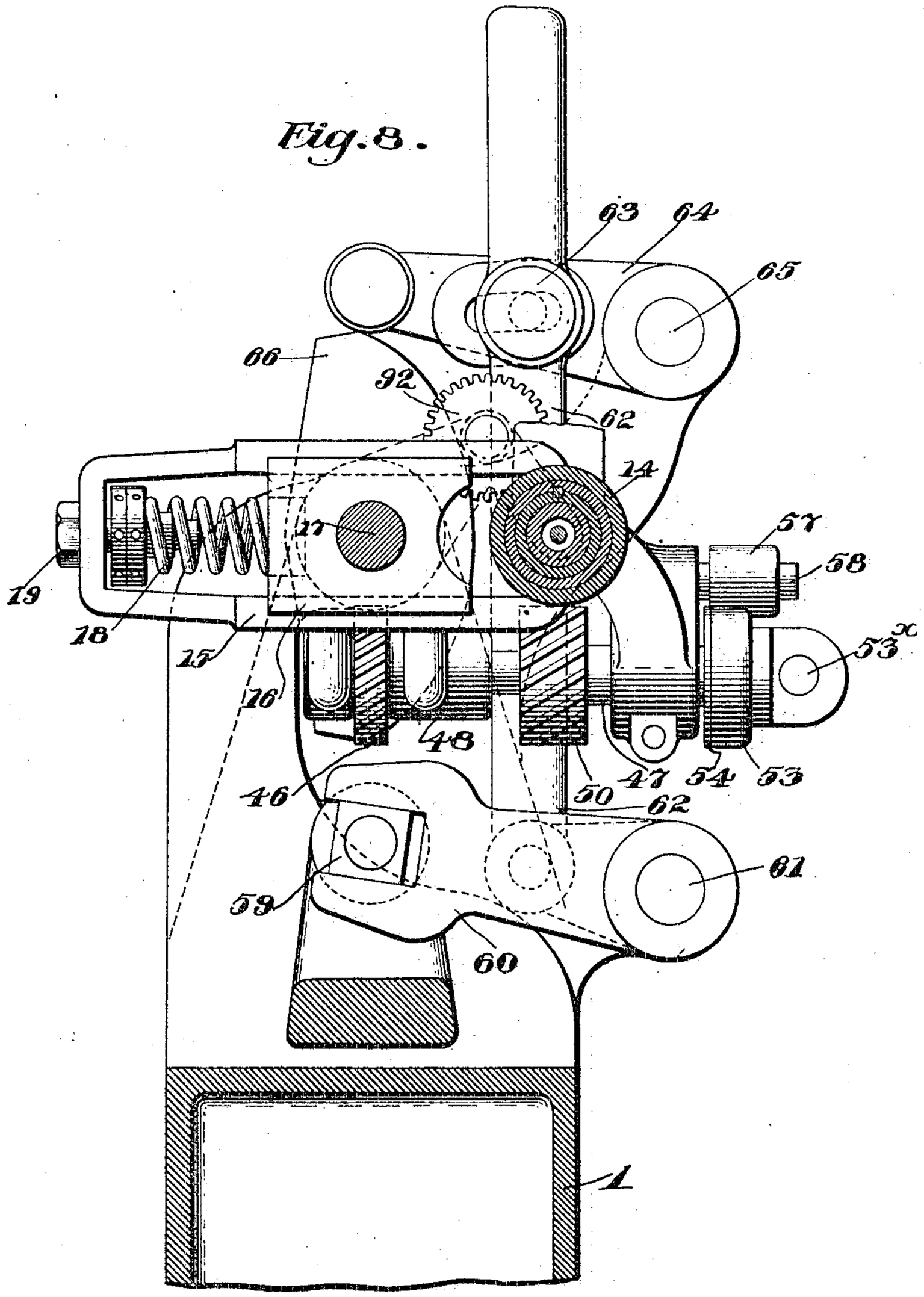
Fig. 8.



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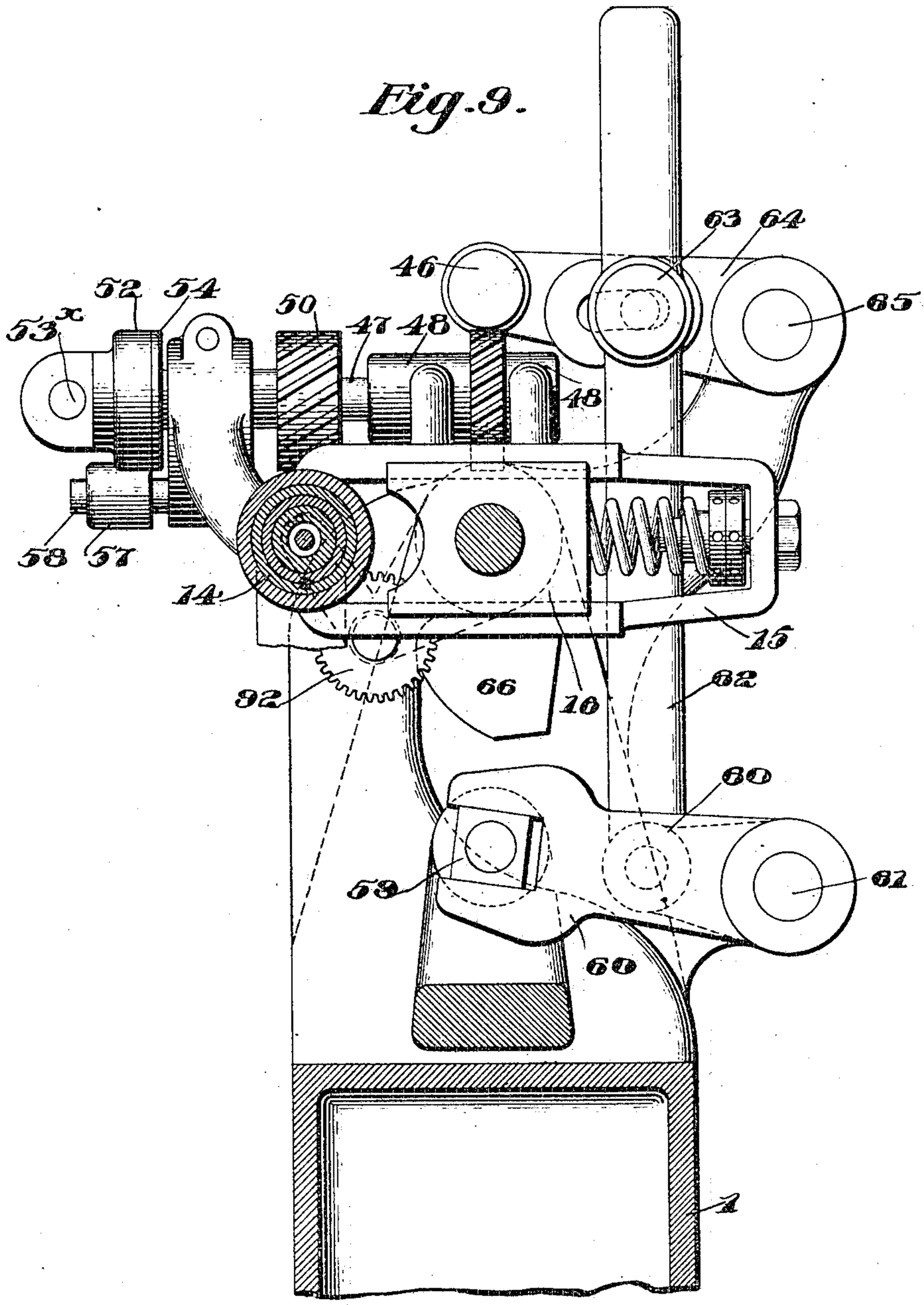
8 SHEETS—SHEET 6.

Fig. 9.



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8 SHEETS—SHEET 7.

Fig. 10.

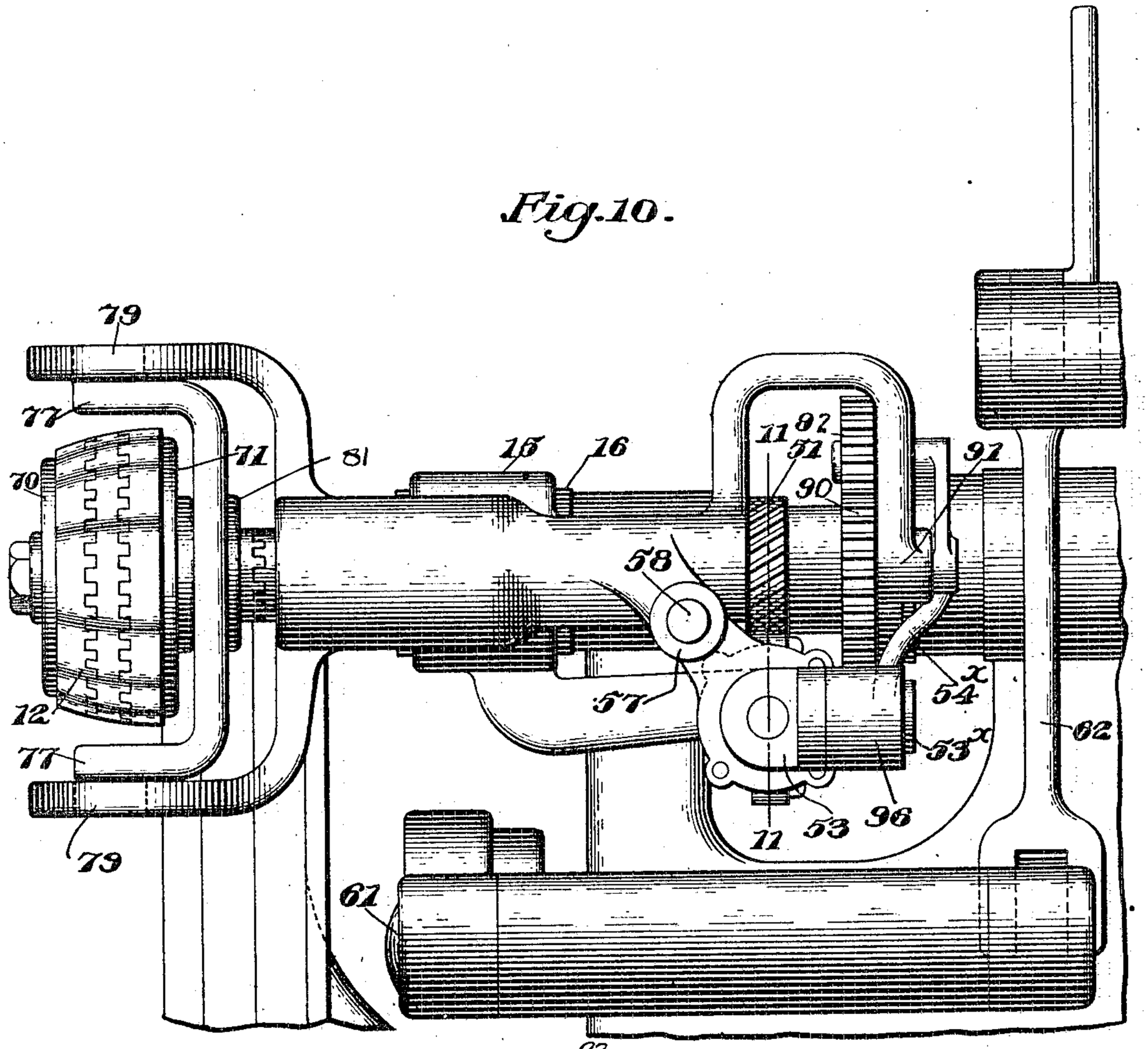
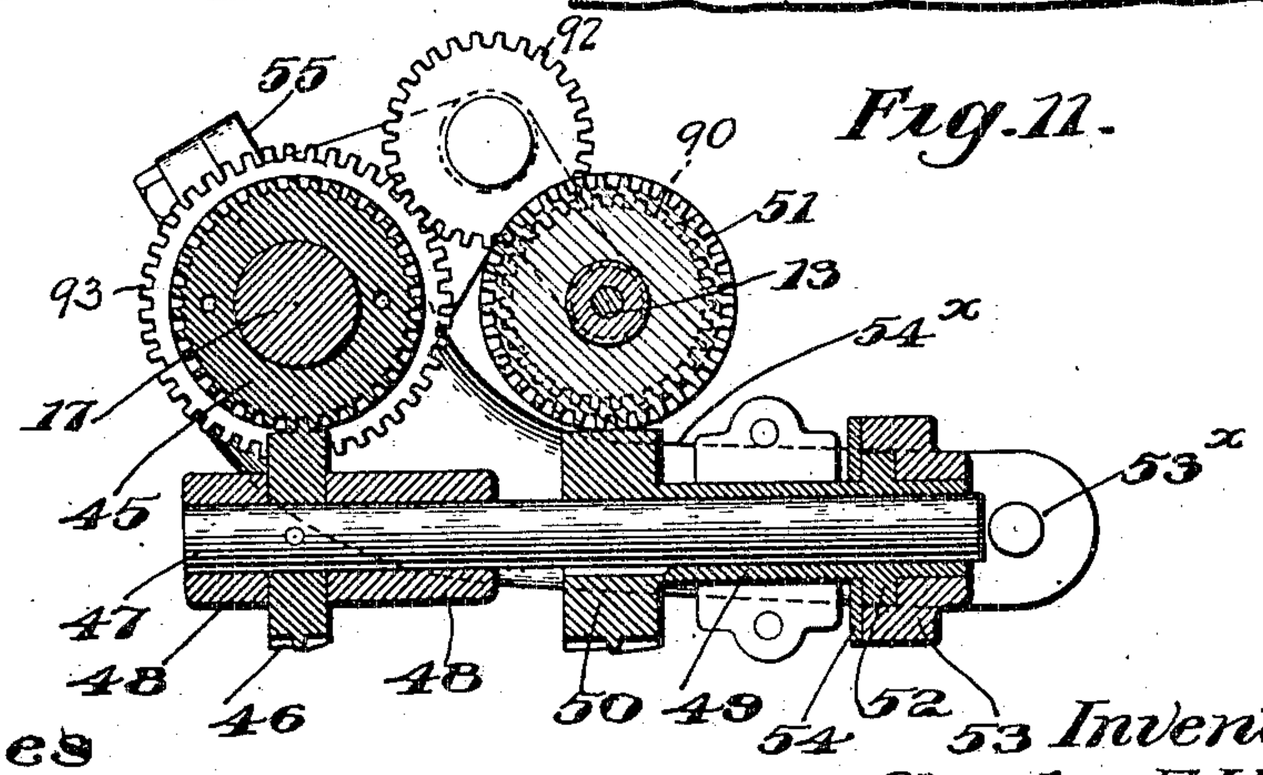


Fig. 11.



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8 SHEETS—SHEET 8.

Fig. 12

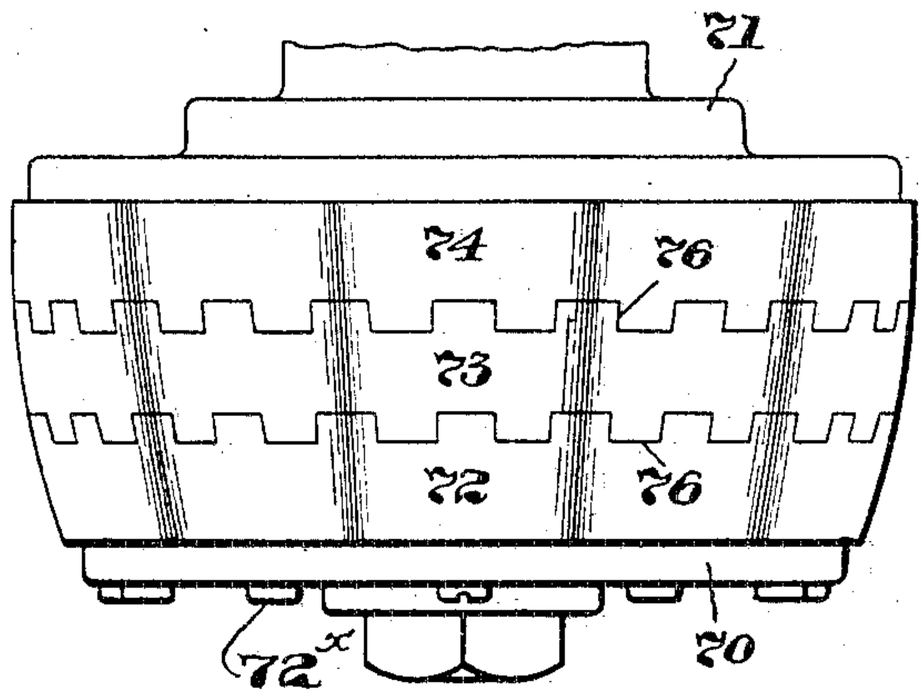


Fig. 13

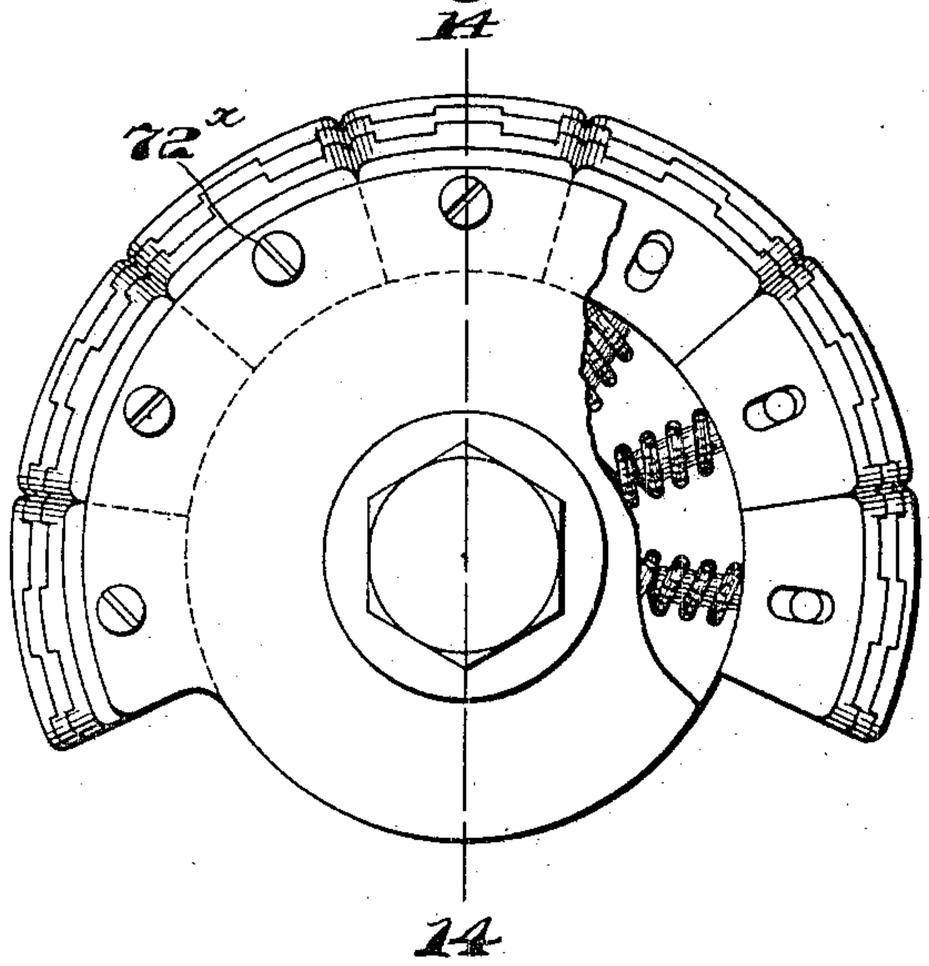
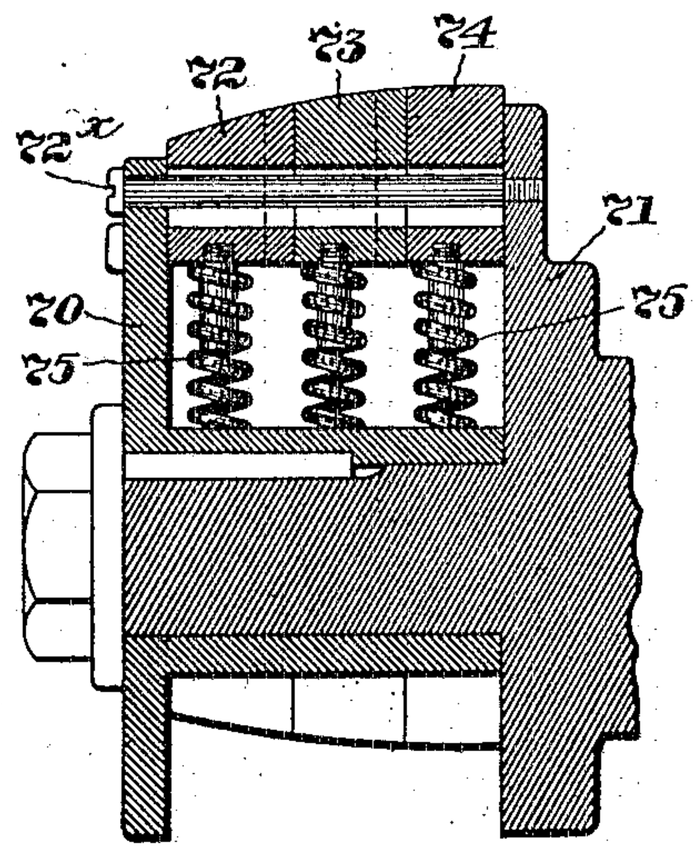


Fig. 14



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UNITED STATES PATENT OFFICE.

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HEEL-BURNISHING MACHINE.

957,958. Specification of Letters Patent. **Patented May 17, 1910.**

Application filed May 2, 1906, Serial No. 314,807. Renewed March 2, 1910. Serial No. 546,763.

To all whom it may concern:

Be it known that I, CHARLES E. HOOD, a citizen of the United States, residing at Lynn, in the county of Essex and State of Massachusetts, have invented an Improvement in Heel-Burnishing Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

In the manufacture of boots and shoes the shape or contour of the heel plays an important part in the production of the desired effect presented by the boot or shoe as a whole. For the best effects also the heel is rarely of uniform shape or curvature throughout its entire exposed surface, but varies constantly from the breast line at one side, around the back of the heel to the breast line at the opposite side. This variation in shape is produced in part by the heel shaver and in part by the scouring which follows the shaving. All care and effort may, however, prove to have been wasted or largely nullified if the desired shape produced first by shaving and then by scouring is not reproduced or enhanced by the final finishing of the heel surface.

A number of methods or processes are in existence for applying to the exposed heel surface a wax or finish which may be brushed up upon a brush or felt wheel to produce a finished surface without changing the general shape left by the scourer, but finishes of this sort are not of the most permanent character, the most permanent finishes being obtained only by means of a heated ironing or burnishing iron or tool.

My invention relates particularly to machines of the latter type, and it aims to provide a burnishing machine which can be relied upon to give a perfectly accurate burnished heel surface of predetermined desired shape or curvature to heighten the effect produced by the scouring or even to change it if desired.

Prior to my invention, so far as I am acquainted with the art, heel burnishing machines have been either of fixed and uniform curvature throughout and adapted either to rotate or oscillate against the heel surface, or they have been made sectional with the sections mounted to yield individually and relatively to permit the burnishing tool or iron to follow so far as the construction would permit, the shape given to the heel by the scouring. It has been found impossible, however, to produce a tool of this latter character that will follow accurately and sufficiently an irregularly shaped heel. Furthermore it is desirable not only to follow accurately a heel shape, but if necessary to be able to heighten the effects or shapes during and by the burnishing process over and above those produced by the scouring and this, of course, a merely following or adapting tool obviously cannot do.

My invention contemplates among other things a burnishing tool which is given a predetermined and irregular shape or pattern such that when presented properly to a heel will produce a burnished heel surface of predetermined variable character, either to follow accurately or if necessary to modify the surface left by the scouring.

In the preferred embodiment of my invention I provide a tool having a surface from one to the other limit of its active face which shall be complemental to the desired heel surface from one to the other end thereof, and this tool is given a short and rapid vibratory or oscillatory action to produce the required ironing or burnishing effect upon the heel surface, and is caused gradually to progress around the heel, or the heel is caused to progress along the iron so that new parts of the tool are brought into position as required to act upon successively new parts of the heel, in predetermined order or adjustment so that the surface of the iron that is acting for the time being upon a given surface of the heel shall always conform accurately to that heel surface or to the desired heel surface thereat, even though much irregularity is required in the surface at various points around the heel.

This tool may be made sectional if desired, without destroying its variable shape giving capacity, and also it may be given a rocking or transverse movement from top to bottom of the heel to increase the burnishing effect, and to enable it with certainty to reach all hollow places or irregularities in the heel surface.

The above with other features of my invention will be best understood fr m a detail description of a machine strating one embodiment thereof, which is shown in the accompanying drawings and from which

the broad features of my invention will be apparent.

In the drawings referred to, Figure 1 illustrates in side elevation partly in section a machine made in accordance with one embodiment of my invention; Fig. 2 is a front elevation of the machine shown in Fig. 1; Fig. 3 is a rear elevation thereof; Fig. 4 a top or plan view of said machine; Fig. 5 is a top or plan view on an enlarged scale of a portion of the front end of the head and its working parts showing the clamping plate and tool; Fig. 6 a horizontal section through the portion of the head shown in Fig. 5 said section being taken on the dotted lines 6—6, Fig. 7; Fig. 7 is a front elevation of the front end as shown in Figs. 5 and 6; Fig. 8 is a vertical section on the dotted lines 8—8 Fig. 6 looking to the left; Fig. 9 a similar view showing the parts in opposite extreme position; Fig. 10 a top or plan view of the part shown in Figs. 5 and 6 and a left hand view of the part shown in Fig. 9; Fig. 11 a section on the dotted lines 11—11 looking to the right of Fig. 10; Fig. 12 an edge view of one form of burnishing tool that may be used; Fig. 13 a face view thereof, Fig. 14 a section on the dotted line 14—14, Fig. 13, and Fig. 15 is a detail of the clutch.

In the embodiment of my invention selected herein for illustration and shown in the drawings, referring first to Fig. 1, the column 1 is provided at its upper end at the front with a jack slide 2 in which is mounted a vertically sliding jack plate 3 provided with a forwardly extended arm 4. In this arm is slidably mounted a jack clamp 5 normally held in its retracted position by a spring 6 and adapted to be moved to the left into last holding position by a bell crank 7 fulcrumed at 8 in the jack arm, and adapted to be acted upon by a cam 9 on a hand wheel 10. A shoe upon its last is placed in the machine in the position indicated in dotted lines, Fig. 1, with the top lift of the heel and the bottom of the sole seated squarely upon the jack plate 3, in which position it is held by turning the hand wheel to throw the clamping member 5 against the top of the last. When so clamped the shoe may be moved by and with the jack vertically into one or another position as required and as will hereinafter appear.

Referring to Fig. 7, to assist in jacking the shoe with its heel in proper position, the jack plate is provided with a breast gage or rest 11, upon which the breast of the heel is seated before the shoe is clamped in position. Referring still to Fig. 7 and assuming the shoe to be positioned as indicated in dotted lines with the heel resting upon the breast gage 11, if the tool 12 be rolled about the heel from the position at the right, Fig. 7, passing upward along the right hand side of the heel about the back thereof and down at the left hand side, to the position indicated in dotted lines, every part of the tool and surface will come into rolling contact with a corresponding part of the heel surface. If the heel be imagined to be of wax it will be apparent that such rolling of the tool about the heel would give the heel throughout, its own varying shape, *i. e.* its own shape would be communicated complementally to the heel and produce a heel the shape of which could be determined with accuracy before hand and by shaping the tool. A mere rolling action, however, is insufficient to burnish a hard heel, consequently I have provided means for oscillating the tool rapidly through a limited range of oscillation and without arresting its oscillation causing the tool gradually to roll or be carried about the heel. The effect of this is to cause the oscillations to progress around the heel as the point of contact of the latter progresses along the tool or the tool around the heel. In this manner I obtain an oscillatory progressive contact in place of a simple rolling contact, as used in the illustration of the wax heel. This oscillatory action is communicated through the tool upon the heel irrespective of the cross sectional curvature of the tool at any point or points throughout the length of its surface, so that said shape may be varied as desired, without interfering in the least with the oscillatory action thereof. To obtain this combination of movements said tool is herein shown as mounted fast upon the end of a spindle 13 which, see Fig. 6, is loosely mounted in the rotatable head 14, see also Fig. 8, of a yoke 15 adapted also to slide on a rectangular block 16 fast upon the end of a gear shaft 17. Rotation of this gear shaft will through the said rectangular block cause similar rotation of the yoke 15 carrying the tool spindle and tool to carry the latter about the heel. The yoke, see Fig. 8, is extended to receive between its end and said block a spring 18 held under adjusted tension by a screw 19 and which tends to pull the tool normally toward the shaft 17, Fig. 8, to maintain it always under suitable pressure upon the heel during its radial or swinging movement thereby to enable the tool to follow the irregular shapes of heels presented to it. This gear shaft 17 is rotated about a fixed axis in the column and is provided at its rear end, see Fig. 1, with a gear 20 in mesh with a vertically movable rack 21, mounted in suitable guides in an arm of the column. The lower end of said rack is connected at 22 with a rocker lever 23 fulcrumed at 24 in the column and connected at 25 with a pitman 26 leading to a crank pin 27 on a worm gear 28 journaled at 29 in the column. This worm gear is

driven by a worm 30 fastened on a clutch shaft 31 journaled in the column. Loose upon this clutch shaft is a clutch member 32, the sleeve like hub of which is extended rearwardly or to the left, Fig. 1, and is fitted outside said column with fast and loose pulleys 33 and 34. A foot treadle 35 fulcrumed at 36 controls a release lug 37 which, upon release, permits the clutch member 32 to be connected automatically with the shaft 31 to rotate the latter by and with said clutch wheel a predetermined number of revolutions. Fulcrumed directly over said lever is a clutch holding or timing device shown as a bell crank 38 the lower depending arm of which extends normally in front of a lug or seat 39 on said lever, against which said lever is pulled by a spring 40. The horizontal arm of said bell crank extends normally in front of the pitman extension 41. When the treadle lever is depressed to release the clutch and rotate the shaft this bell crank 38 springs into the seat 39 causing the end of its horizontal arm to be raised into the path of movement of said pitman extension 41, so that when the said extension turning in the direction of the arrow, Fig. 1, completes one revolution it strikes the end of said bell crank arm, depresses the latter and thereby disengages the depending arm from the seat 39. This releases the treadle and permits the latter to be raised to cut out the clutch. Thus one depression of the treadle causes one and only one rotation of the worm wheel 28, produced by a predetermined number of rotations of the worm. When cut out, the worm shaft is arrested by contact of the lug 42 thereof with a spring arm or stop 43, which cushions the same against shocks. In lieu of the clutch described any other well known or suitable type may be employed.

Rotation of the worm gear by turning the crank pin 27 through one revolution causes the rack 21 to be first depressed and then raised, thereby through the rack gear 20 to rotate the gear shaft 17, to carry the tool spindle and its tool first around the heel in one direction to the opposite side thereof from its starting point, and back again to its starting point, giving two complete traverses of the tool over the heel surface.

I prefer a plurality of traverses of the tool over the heel surface, but of course a machine may be adapted in a manner readily understood by any skilled mechanic to vary the number of traverses according to the results desired.

For the best results the contact of the tool with the heel should not be relied upon to cause that rolling action or traveling action of the tool, which is necessary to cause its active surface to progress as the tool travels about the heel. To impart a positive progressive movement to the tool I have provided mechanism best shown in Figs. 1, 6, 10 and 11.

Viewing first Fig. 1, the leading bearing 44 for the gear shaft is made conical, see Fig. 6, and has fixedly secured to it a non-rotative spiral gear 45. This spiral gear, see Fig. 11, has a mating gear 46, fast on a shaft 47 which extends parallel with the yoke 15, see Fig. 8, and is journaled in bearings 48 extending therefrom. Splined upon this shaft 47 is a sleeve 49 provided at one end with a spiral gear 50 in mesh with a driving and mating gear 51 that is fast on the tool spindle 13, see Fig. 6. By means of this train of spiral gearing it is clear that as the burnishing tool 12 is revolved about the gear shaft 17 and the heel, it will be given rotative movement about its own axis 13 which will cause that part of the tool surface which is presented to the heel to progress gradually along the heel surface as well as circle about the heel; and it matters not whether the movement of the tool about the heel be in one or the opposite direction, the same tool surface will always be presented to the same heel surface so that a plurality of traverses of the heel may always be had with entire safety and assurance that the resultant heel surface will be as predeterminately arranged by the shaping of the tool.

To produce the oscillations of the tool thereby to obtain the burnishing action at the point of contact of the tool with the work, it is only necessary to reciprocate the splined spiral gear 50 on its shaft 47 to cause its teeth sliding in the teeth of the mating spiral 51, to produce an oscillation of the latter and the attached tool, and of course, this oscillation will result whatever be the rotative position of the tool relative to its own axis 13. To accomplish this reciprocation of the spiral 50 and its sleeve 49 I have provided the latter, at its end opposite said gear with a flange 52 which is embraced between the head 53 and an opposed plate 54 secured thereto. This head has pivotally connected to it at 53^{x}, an eccentric rod 54^{x}, leading to an eccentric 55 upon a sleeve 55^{x}, which surrounds the gear shaft 17, see Fig. 6. This sleeve extends rearwardly in the bearings provided therefor in the column, and at its rear end but at the right of the gear 20, Fig. 1, is provided with a belt pulley 56 which may be belted to any suitable pulley, not shown, but which will rotate said sleeve at the proper speed to cause rapid reciprocations of the splined spiral gear 50 and produce thereby rapid oscillation of the tool 12.

To assist in guiding the spiral gear 50 in its reciprocations I have provided the head 53, see Figs. 6 and 10, with a guiding arm 57 which slides freely upon a stud 58 fast on the bearing 14 for the tool spindle 13.

This preserves the alinement and position of the gears so as to enforce uniform oscillation of the tool.

The first spiral gear 45 of the series being fixed, enforces progressive rotation of the tool about its own axis and while the tool is revolved by the rack and rack gear bodily about the heel it is clear that at any point in its travel of the tool either bodily about the heel, or rotatively about its own axis, the reciprocations of the spiral gear 50 will oscillate the tool throughout and consequently at any point of contact with the work. This arrangement furnishes an exceedingly simple and effective mechanism for accomplishing this result. As a matter of fact the oscillations, the progressive rotation and the revolution of the tool about the heel proceed simultaneously.

If the heel were semicircular or approximately semicircular in shape then the swinging of the tool spindle about the axis of the gear shaft would cause the tool to travel approximately in the line of curvature of the heel surface. In practice, however, heels are rarely of approximately semicircular shape, they present, as a rule, substantially flat or straight surfaces from about the middle points of their sides forward to the breast line. Because of this and because the tool commences its work at the breast line at one side of the heel and continues to the breast line at the opposite side of the heel the swinging movement should not commence until the tool has progressed for some distance first up the side of the heel and then after it has swung about the back thereof, the swinging movement should cease short of the limit of its traverse toward the breast of the opposite side.

The necessary substantially straight traverse of the tool and heel one relative to the other from the breast line rearward at one side and finally from the middle of the heel breast-ward at the opposite side may be had by moving either or both the members, but I have found it more convenient to restrict the movements of the tool to those of rotation and revolution alone and to obtain the substantially straight relative movements by moving the heel past the tool. For this purpose the jack plate 3 and jack by which the shoe is jacked into position are made to rise and fall vertically as heretofore stated. To control this movement so that it may occur at the proper times and speeds I have provided said jack, see Figs. 1, 7, 8, and 9, with a pivoted block 59 embraced by the forked end of an arm 60 which is fulcrumed at 61 upon the column head. Jointed to this arm between its ends, is a connecting rod 62 that rises past the gear shaft, see Fig. 8, and near its upper end is adjustably connected by means of a clamp stud 63 by slot engagement with a lever 64 fulcrumed at 65 upon the column head and bearing at its free end upon a cam or pattern 66 fast on the gear shaft 17. This gear shaft as stated works in fixed bearings and revolves the tool about the back of the heel. Consequently this cam may be and is so shaped, as shown, that when the machine is first started and before the crank pin 27, Fig. 1, has moved far enough to impart to the tool its maximum rate of traverses in a circular direction the jack will be dropped at a relatively high speed past the tool to cause the substantially straight side of the heel from the breast rearward to about the middle of the heel to pass in front of and be acted upon by the oscillations thereof. In as much as the progressive rotation of the tool about its own axis in the construction shown results from the revolution to carry the tool about the heel, it is clear that there will be little progression of the tool to change the tool surface presented to the heel during the drop of the heel past the tool. This is no detriment rather, it is as desired, because from the breast rearward to about the middle of the heel there is as a rule little or no change in vertical or transverse curvature of the heel face.

At about the time the heel reaches its lowermost position, which is at about the time when the heel curvature commences to exhibit variations, the movement of the crank, 27, Fig. 1, will begin to impart maximum progressive rotation and revolution to the tool. As the crank approaches its most elevated position, Fig. 1, marking one half its travel the tool will have been carried around the back of the heel to about the middle of the opposite side thereof, and as the crank diminishes its movement to nothing the cam 66 on the gear shaft will now lift the jack and heel to cause the necessary relatively straight traverse of the tool along the straight surface at the opposite side of the heel and extending from about the middle thereof to the breast. These movements are exactly reproduced but in reversed order during the second half rotation of the crank 27 during which time the tool retraces its movement back around the heel to its starting point.

I believe I am the first to provide, among other things, a heel burnishing machine having a tool presenting in different positions predetermined differently shaped surfaces capable of acting predeterminately upon or producing different shapes of heel surface, with means for producing a relative change of position between the heel and tool to enable the latter to present these differently shaped surfaces to and for action upon the heel and the patent here applied for is intended to cover this idea broadly without reference to any particular mechanical embodiment thereof.

Bearing in mind that the shoe is held in the hands of the operative during the shaving and also during the scouring of the heel, it will be understood that there are inevitably many though comparatively slight variations in the work; these variations presenting themselves in the form of irregularities in outline curvature and depressions formed by varying pressure of the work to the tools or otherwise. Because of these it is difficult to obtain expeditiously a sufficiently good job of burnishing with a tool that is solid or rigid throughout. To correct this difficulty and to provide for obtaining as perfect a piece of work as may be, in the shortest possible time, my invention provides for a novel construction of burnishing tool, in sections or members, which are relatively yieldingly supported, to permit them to rise and fall or play to and from the heel surface to which they are presented, the better to enable them to seek out and finish all portions of the heel surface, however irregular the same may be.

Whether made in a single integral piece or in sections as described, the tool will perform better work if caused to oscillate vertically, that is from top to bottom of the heel as well as in the direction around the heel. To accomplish these results I have shown in the drawings Figs. 12 to 14 inclusive and also principally in Figs. 4 and 6, one type of mechanism illustrative of this idea.

Referring first to Figs. 12 to 14 inclusive, the tool comprises front and back plates, 70, 71, connected at regularly spaced intervals by cross studs 72ˣ, which may be screw studs. Between these plates are arranged the tool sections 72, 73 and 74, each slotted radially to receive and slide upon said stud screw 72ˣ. Each tool section is supported radially by a spring 75, which tends constantly to press it outward into contact with the work. These sections are short in length, so that in the oscillations and travel of the tool they may play in and out radially and independently to enable them more or less completely to find the inequalities in or adapt themselves to the heel surface acted upon. The ends of the sections are rounded or eased off as shown to enable them to make easy contact with the work, and to prevent any mark upon the heel where the parallel rows of sections travel about the heel I have interlocked the adjacent side faces of the sections as at, 76, Fig. 12. By making these interlocking portions rectangular, they do not interfere with the free play of the sections relative to each other nor do they leave any open space which would interfere with the burnishing action.

The tool as shown is merely typical of tools which may be variously devised to accomplish the same result and may, for identification, be denominated a patterned tool, although it is evident that this or other character of tool may be employed in connection with other features of the invention and that these features themselves may be variously used in conjunction or otherwise, as will be obvious to one skilled in the art.

To impart a top to bottom oscillation to the tool I have provided the plates 70, 71, see Fig. 10 with diametrically opposite ears, 77, which travel longitudinally in arch shaped slots, 78, in arms, 79, that project forward from the bearing 14, for the tool spindle. The axis of these slots is preferably coincident with the tool surface at the point where it contacts with the heel, so that if said tool be reciprocated in the general direction of its axis it will have imparted to it a swinging movement that will be equivalent to rocking or rolling it upon the heel surface from the top to the bottom thereof. This action brings every point of the tool surface into effective contact with the heel surface, yet does not shift the tool transversely of the heel at its line of contact therewith, thus permitting the edge of the tool to follow accurately the heel seat or rand line over or into which it laps as shown. To produce this reciprocation of the tool the back plate 71 (see Fig. 6) is provided with a threaded socket 80, that receives the threaded end of a socketed head, 81. This head at its rear side is provided with a series of crown teeth, 82, that mesh with similar teeth in the end of bushing, 83. This bushing is splined within the tool spindle, 13, which is made hollow for the purpose, and at its inner end said bushing is supported yieldingly by a spring, 84, seated upon the shoulder end of a rod, 85, longitudinally movable within said spindle. The leading end of said rod is universally connected with the socketed head 81 on the tool so that as said rod is reciprocated within the hollow spindle, 13, it will cause like reciprocation of the tool, while permitting the tool to assume any radially angular position given it by the curved slots 78, described. As the tool is pushed forward the spring supported toothed bushing 83, follows it up to maintain its toothed engagement therewith so as to cause rotation thereof by and from said bushing at all times. At its inner end said rod 85 is provided with a cam head 87 which is fast thereon and between said head and the end of the tubular spindle 13, is interposed a spring, 88, that presses said rod normally rearward. Rotatively mounted opposite said cam head, 87, is a complemental cam, 89, fast on a gear, 90, mounted upon an arbor loosely mounted in a bearing, 91, yoked over from the bearing, 14. This gear, 90, is driven through an idler, 92, from a gear, 93, fast on the sleeve, 55ˣ, (Fig. 6) referred to. The train

of gears, 93, 92 and 90, hold the latter gear against oscillation by and with oscillations of the tool spindle, consequently as the latter oscillates in front of it the cam face of the rod head, 87, oscillating in front of the cam, 89, on the gear, 90, will impart to said rod and to the tool rapid endwise reciprocations necessary to give the vertical or top to bottom rocking of the tool. These movements, like the oscillations of the tool, follow the tool throughout the travel of the latter so that the action at all points around the heel is substantially uniform.

Having described one embodiment of my invention and without restricting the invention to this embodiment herein shown and described what I claim and desire to secure by Letters Patent is;—

1. A heel burnishing machine comprising a heel support and a tool, the latter presenting in different positions differently shaped burnishing surfaces with means for changing the relative positions of said support and tool to enable said different burnishing surfaces to be presented to and for action upon the heel.

2. A heel burnishing machine comprising a heel support, a tool predeterminately shaped throughout its length to produce different predetermined shapes about the heel and means for changing the relative positions of said support and tool to enable the latter to produce a predetermined variable surface upon the heel.

3. A heel burnishing machine comprising a heel support, a variably patterned tool and means to change the relative positions of said support and tool to cause different portions of the pattern of the tool to be presented to the heel and means for relatively oscillating the heel and tool while in such position.

4. A heel burnishing machine comprising a heel support, a burnishing tool having varying shaped surfaces at different portions of the tool with means for producing a back and forth relative movement between the heel and the tool, and means for imparting a relative progressing movement between the heel and tool.

5. A heel burnishing machine comprising a heel support, a patterned tool, means to produce relative traverse of the tool and heel without substantially changing the shape of tool surface presented to the heel, and also a relative traverse coupled with a substantial change of shape of tool surface presented to the heel.

6. A heel burnishing machine comprising a rising and falling jack and operating means therefor and a revoluble and rotatable tool coöperating therewith.

7. A heel burnishing machine comprising a heel support, a burnishing tool having a curved patterned burnishing surface with means for changing the relative positions of said support and tool to cause the tool to bring its pattern surface progressively into action and to traverse around the heel to present its said surface at different points throughout the same.

8. A heel burnishing machine, a heel support, a patterned faced burnishing tool, means to cause relative change of position of said support and tool to cause the latter to traverse around the heel and to present its pattern surface progressively to the heel and also to cause oscillation of said tool during its traversing and progressing movements.

9. A heel burnishing machine comprising a heel support, a burnishing tool and means to provide a progressive oscillatory and traversing movement between said heel support and tool.

10. A heel burnishing machine comprising a heel support and tool, means to impart thereto a relative progressive oscillatory and traversing movement with means for maintaining the tool in yielding engagement with the heel throughout said movements.

11. A heel burnishing machine comprising the pattern faced tool 12, the rack and gear for revolving it, the spiral gears for rotating it and also for oscillating it substantially as described.

12. A heel burnishing machine comprising the pattern faced tool 12, the rack and gear for revolving it, the spiral gears for rotating it and also for oscillating it, and the jack and its moving means substantially as described.

13. A heel burnishing machine comprising a shoe support, a burnishing tool and means to impart to the latter a bodily rocking motion transversely or vertically of the heel, and also to impart to said tool and shoe support a relative traverse movement around the heel.

14. A heel burnishing machine comprising a shoe support, a burnishing tool and means to impart to the latter a bodily to and fro rocking motion transversely or vertically of the heel.

15. A heel burnishing machine comprising a shoe support, an oscillatory pattern surfaced burnishing tool, means to impart to said tool and work support a relative progressive movement to cause the tool to traverse around the heel, and means to impart relative movement to said support and tool transversely of said traverse movement.

16. A heel burnishing machine comprising a sectional tool, means to oscillate it around the heel and means also to rock it from top to bottom of the heel.

17. A heel burnishing machine comprising a work support, a pattern faced burnishing tool, means to impart progressively oscillatory movement between the tool and work support around the heel of a shoe on said

support, and means relatively to move said tool and support to cause transverse movement between the tool and its work.

18. A heel burnishing machine comprising a work support, a sectional burnishing tool and means to traverse it around the heel, to oscillate it during its traverse movement, and to swing it from top to bottom of the heel also during said traverse movement.

19. A heel burnishing machine comprising a sectional tool, means to impart burnishing movement thereto in the general direction of division between its sections, and means to roll or rock said sections transversely of said burnishing movement to permit them to search out and act upon depressions in the surface to be burnished.

20. A heel burnishing machine comprising a burnishing tool, means to oscillate it, means to move it axially, and means to change the direction of said axial movement to cause the active face of said tool to roll, without traveling in the direction of roll.

21. A heel burnishing machine comprising a heel support a tool, its spindle, a crown tooth connection between the tool and its spindle, universally jointed means for endwise moving said tool, and means to oscillate and also to traverse said tool relative to a heel on said support.

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

CHARLES E. HOOD.

Witnesses:
IRVING U. TOWNSEND,
EVERETT S. EMERY.