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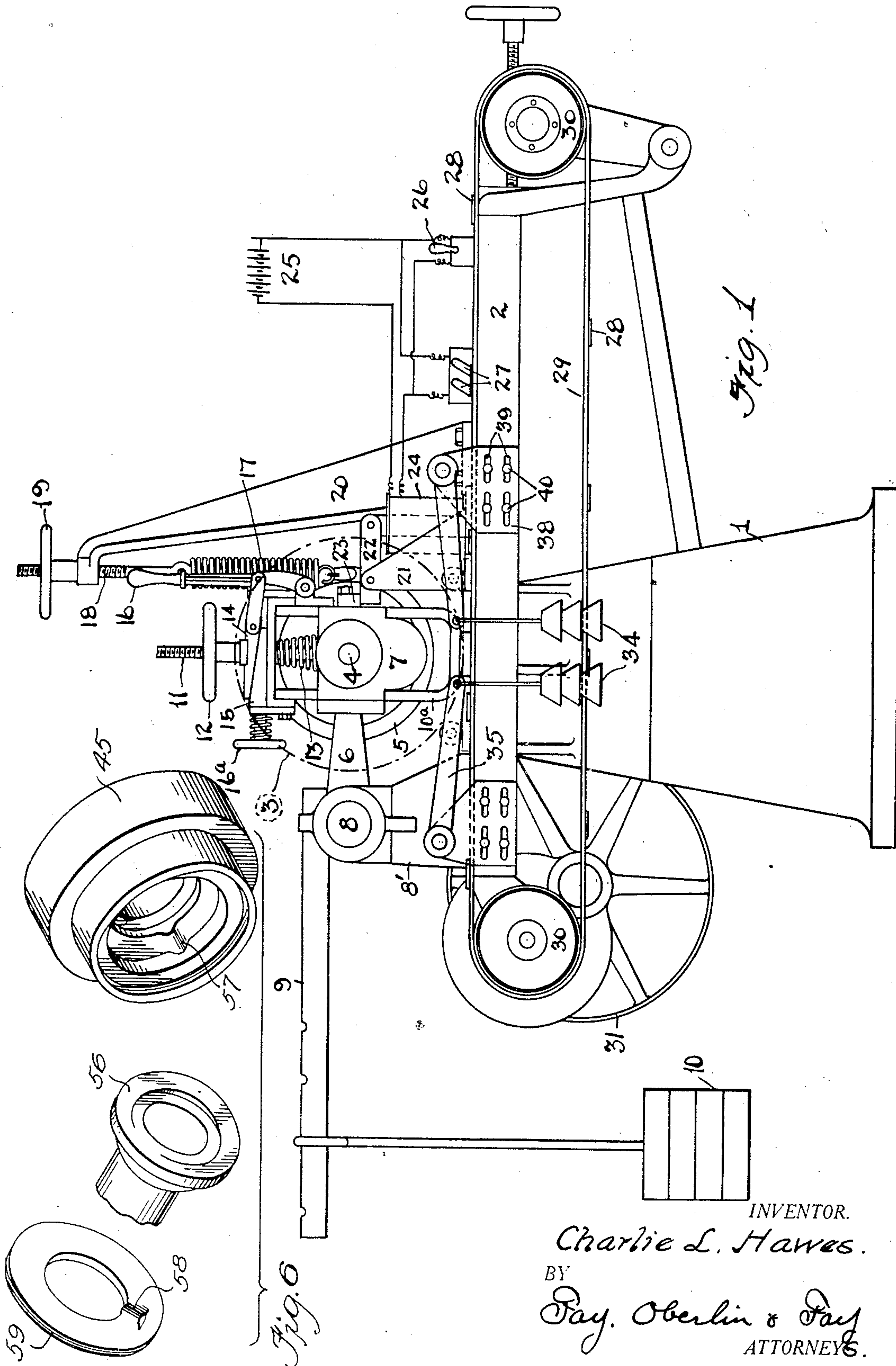
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1,897,049

POLISHING AND GRINDING MACHINE

Filed July 22, 1926.

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

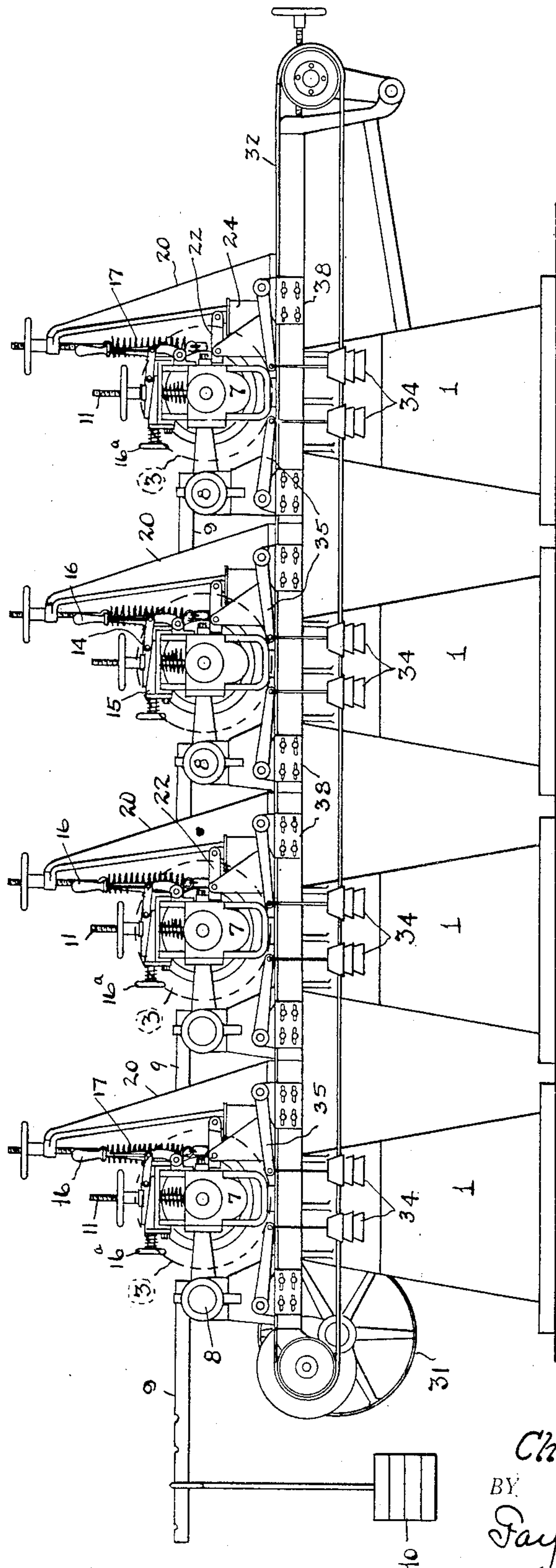


Fig. 2

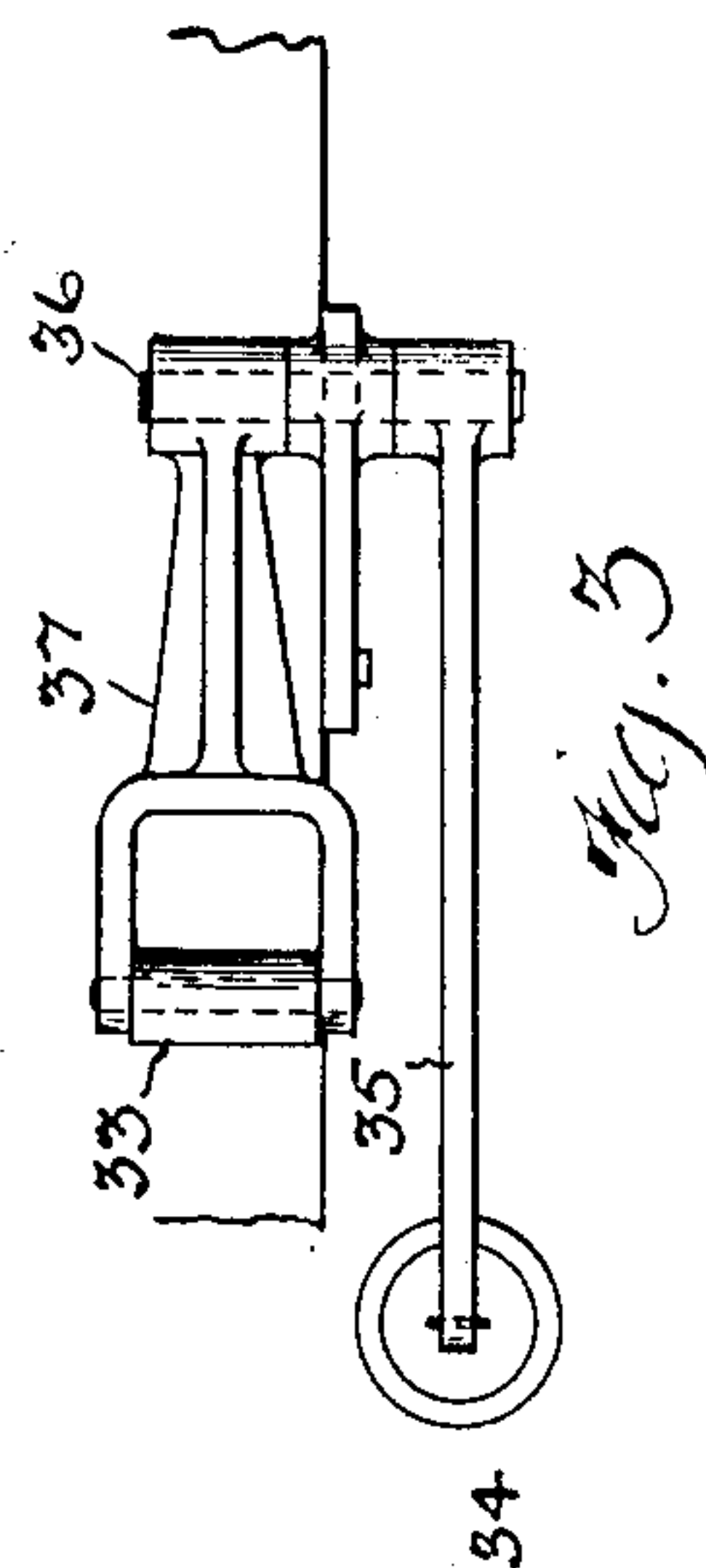


Fig. 3

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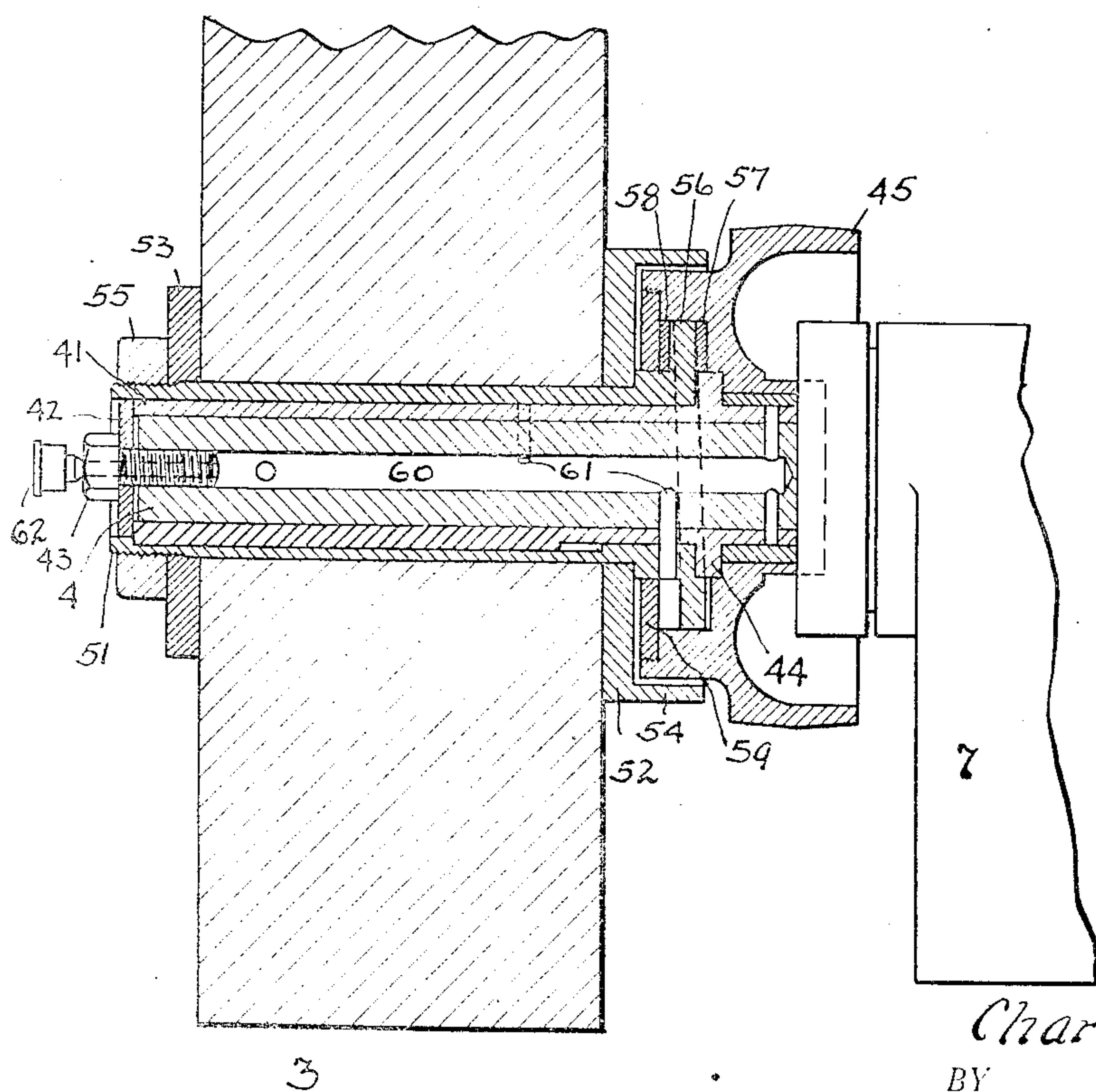
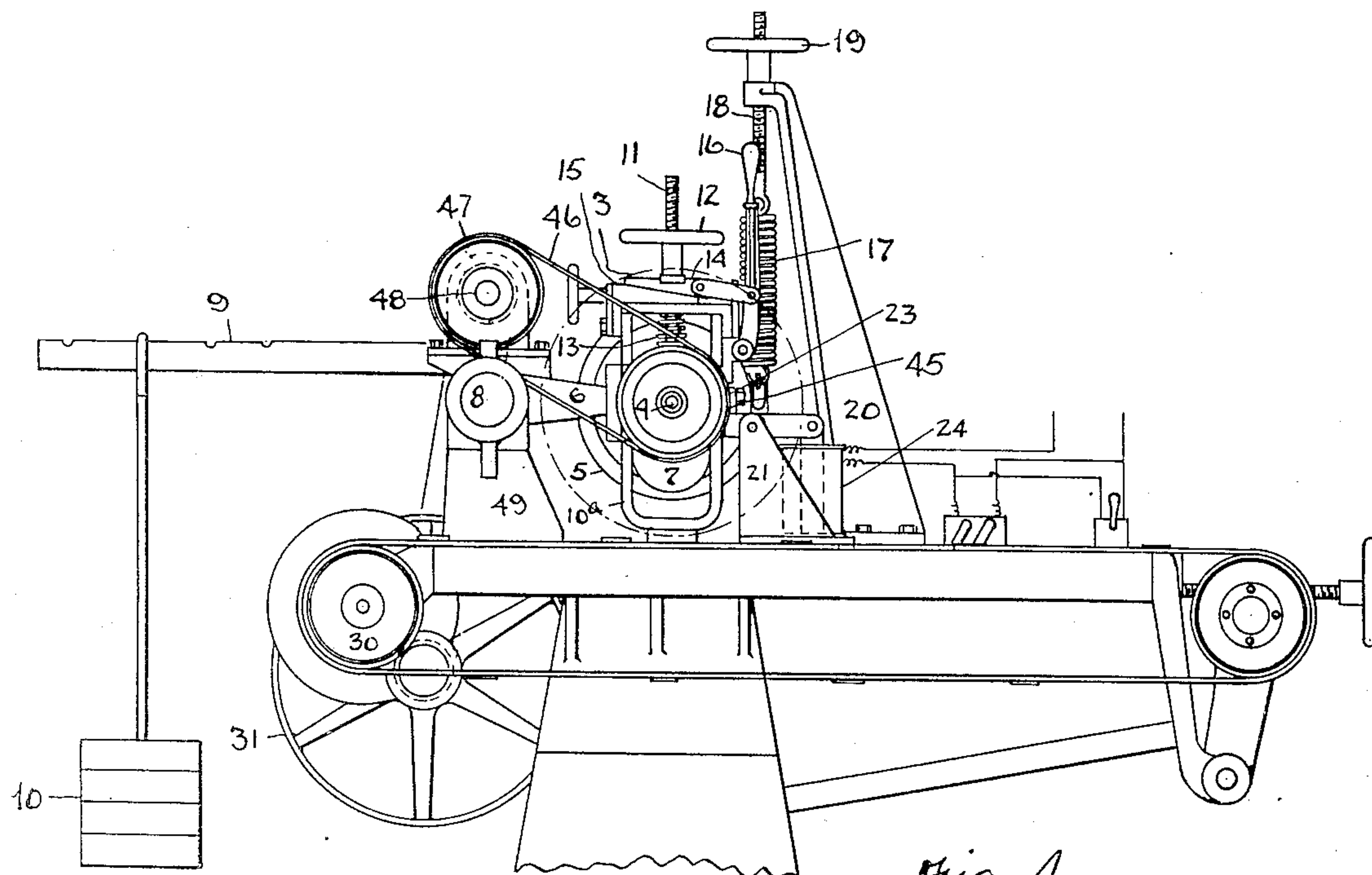
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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POLISHING AND GRINDING MACHINE

Application filed July 22, 1926. Serial No. 124,221.

This invention relates to grinding and polishing machinery, and more particularly to grinding and polishing machines having controlled grinding or polishing heads, and it is among the objects of the invention to provide a quick-action or position-change coarse adjustment for such heads, also a convenient work-feed. A further object is the provision of means for vibrating the rotating grinding or polishing wheel across the work so as to avoid formation of longitudinal scratch marks. Other objects and advantages will appear as the description proceeds.

To the accomplishment of the foregoing and related ends, the invention, then, consists of the means hereinafter fully described, and particularly pointed out in the claims, the annexed drawings and the following description setting forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but several of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:—

Fig. 1 is a side elevation of a construction embodying the invention; Fig. 2 is a similar view of a modification; Fig. 3 is a plan view of a detail; Fig. 4 is a side elevation showing the incorporation of wheel vibrating means; and Fig. 5 is an enlarged sectional detail.

Fig. 6 is a detail view of the wheel reciprocating means.

The reference character 1 in the drawings designates a base of any desired form, preferably of enclosed type, and supported thereon is a bed 2. The grinding or polishing wheel 3 is mounted over the bed, being carried by a spindle 4 which is also equipped with drive means, preferably a motor 5, the spindle being carried on a lever-arm 6 or rather a boxing or mounting 7 on the lever. The grinding wheel assembly with its spindle and motor is rockable on the fulcrum 8 in the standards 3', the arm 6 directly carrying a frame 10a in which is the boxing 7, and the other lever-arm 9 being counterweighted as at 10. The spindle 4 and guide frame 10a are relatively adjustable, a screw-threaded stem 11 extending up from the spindle-box 7 and having a hand-wheel nut 12. A spring

13 coacts with the stem 11. Underneath the nut 12 are a quick-acting or coarse adjustment wedge 14 and a fine adjustment wedge 15. The former may be actuated by a hand-lever 16 which is pivoted to the frame 10a and linked to the wedge. The fine adjustment wedge 15 is actuated by a screw with a hand-wheel control 16a. For the motor 5, it is usually desirable to provide a further adjustable spring support 17 and screw-threaded stem 18, the latter controlled by a hand-wheel nut 19 on a standard 20.

Fulcrumed in brackets 21 is a lever 22, the short arm of which engages under a lug 23 on the frame 10a and the long arm is connected to the armature of an electromagnet 24. Current from a suitable source 25 energizes the magnet and the circuit is controlled by a hand-switch 26 in convenient position for the operator, or the circuit may be automatically controlled by stationary contacts 27 being engaged by a traveling contact 28 so as to complete the circuit through the paired stationary contacts. The traveling contacts are carried by the work-feeding means, this being a movable element such as a moving table or carrier; in the particular form illustrated, an endless belt 29 on drums 30, one being driven by gearing (not shown) and pulley 31. An individual motor drive is more convenient in some cases.

Instead of a single unit machine as in Fig. 1, it is desirable in some cases to arrange the grinding or polishing heads in a gang as in Fig. 2, a traveling carrier or endless belt of sufficient length being arranged in line with all of the grinding heads, there being as many thereof as desired in any given case. Each head has its own drive and motor control and may be adjusted in height as necessary in view of the particular articles to be treated.

The manner of use will be clear from the foregoing. Articles to be ground or polished are supplied by an operator to the traveling-work carrier and are brought under the grinding wheel. The effective height of the grinding or polishing wheel is closely adjusted by the wedge 15 with its hand-wheel control 16a, and when occasion requires, by a

movement of the lever 16 the head may be quickly changed in position up or down as may be desired. In order to raise the grinding or polishing head for articles fed along in series, the automatic circuit control contacts 27 are brought into use, and the contacts 28 being spaced in suitable order in accordance with the feed of articles, each contact 28 as it passes along under the fixed contacts 27 completes the circuit therethrough, and the armature being drawn down by the electromagnet 24, lever arm 22 raises the polishing head. The hand-controlled switch 26 can also be used as occasion requires, this switch or a plurality of such switches being arranged conveniently for the reach of the operator.

In order to steady the work going under the grinding or polishing wheels, a roller or rather series of rollers 33 are arranged in relation to the grinding head and to the work carrier, each of such rollers being resiliently pressed toward the work carrier by weights 34 on arm 35 which is secured to a rock shaft 36 to which in turn an arm 37 carrying the roller is fastened. The shaft 36 is mounted in a bracket 38 which is adjustable. One convenient way of providing the adjustability is by arranging slots 39 in the bracket to receive the stems of screws or bolts, the heads 40 of which can be set down tightly and hold the bracket in desired position on the bed.

For preventing the formation of longitudinal scratch marks on articles being polished or ground, it is desirable to impart a transverse vibratory movement to the rotating polishing or grinding wheel, and means for this may comprise a rotatable mounting and drive for the wheel, an advantageous form of this being as described above, and associated therewith a means for at the same time reciprocating the rotating wheel across the work. One convenient arrangement is shown more in detail in Fig. 5, in which the spindle 4 carries an attached bushing 41 secured by an end plate 42 with a clamping set screw 43. Rotatably mounted on the bushing and confined against axial movement by shoulder 44 is a pulley 45, which may be driven by any suitable means, as a connected motor, or for example by a belt 46, and pulley 47 on a counter-shaft 48 supported by the standards 49, the counter-shaft being driven in turn by a belt from a pulley on the drive shaft of the motor 5. The polishing or grinding wheel 3 is secured to a sleeve 51 by clamping plates 52 and 53, the former abutting a shoulder on the sleeve 51 and having a projecting flange 54 as a dust guard. The plate 53 is engaged by a nut 55. Sleeve 51 is splined on the bushing 41 and means is provided for axial reciprocation of the sleeve 51 and wheel 3. This may be for instance on the order of cam means and the precise detail may vary. A desirable arrangement is a flange cam 56 on the sleeve 51,

coacting with a boss 57 which may be welded on or be integral on the rotating member 45 and a similar boss 58 held in place by a screwed-in head 59. The spindle 4 may have an axial bore 60 and cross bores 61, and by means of a bore in the set screw, and a grease-cup 62, lubrication can be conveniently provided for all parts.

When the spindle 4 is rotated by its drive, the wheel 3 is correspondingly rotated and articles to be treated are fed thereunder. If the member 45 be now rotated at a different speed, the bosses 57 and 58 coacting with the cam 56 move the cam and sleeve 51 with wheel 3 in a corresponding axial motion compounded upon the main rotating motion imparted by the spindle drive. The extent of such axial excursion need not be great, a few sixteenths of an inch covering a range sufficient. If the wheel 3 is being rotated at, for example 1800 revolutions per minute, and the drive 45 be rotated at e. g. 1700 revolutions per minute, the wheel 3 will not only rotate at 1800 revolutions per minute but will also vibrate axially, making 200 passes back and forth across the work per minute. Such compound movement results in the finely finished surface on the work.

Grinding wheels or polishing wheels can be used interchangeably in the assemblies here provided and in the claims hereinafter, such interchangeability and equivalency is contemplated in the expression "grinding wheel".

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated in any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In a machine of the character described, the combination of a spindle having a drive means and a grinding wheel, means for holding such grinding wheel against an article to be treated, and coacting wedges one for effecting a fine adjustment of the position of such grinding wheel, and the other for providing a quick-acting adjustment, means for operating the fine adjustment wedge, and lever means for operating the quick-acting wedge.

2. In a machine of the character described, the combination of a spindle having a driving means and a grinding wheel, a boxing in which said spindle is mounted, a frame in which said boxing is slidable, coacting wedges for backing said boxing, a screw for adjusting one of said wedges, and quick-acting means whereby the other wedge may be directly moved out of or into backing position.

3. In a machine of the character described,

the combination of a spindle having a drive means and a grinding wheel, a boxing in which said spindle is mounted, a frame in which said boxing is slidable, coacting
5 wedges for backing said boxing, a screw for adjusting one of said wedges, and a lever for moving the other wedge out of or into backing position.

4. In a machine of the character described,
10 the combination of a spindle having a driving means and a grinding wheel, a boxing in which said spindle is mounted, a frame in which said boxing is slidable, a screw-
15 stem for adjusting said boxing in said frame, coacting wedges for backing said boxing, a screw for adjusting one of said wedges, and a lever for moving the other wedge out of or into backing position.

5. In a machine of the character described,
20 the combination of a spindle having a drive means and a grinding wheel, a work-carrier movable in relation to said wheel, a boxing in which said spindle is mounted, a frame carrying said boxing, a lug on said frame, a lever engageable under said lug to move the
25 frame and contents, an electro-magnet for actuating the lever, and means operated by the work-carrier for controlling the flow of current to said magnet.

6. In a machine of the character described,
30 the combination of a spindle having a drive means and a grinding wheel, a boxing in which said spindle is mounted, a frame carrying said boxing, an electromagnet for moving the frame, a traveling work-carrier, stationary switch means in circuit with said
35 magnet, and means on said carrier for operating said switch means to control the flow of current to said magnet.

7. In a machine of the character described,
40 the combination of a spindle having a drive means and a grinding wheel, a boxing in which said spindle is mounted, a frame carrying said boxing, a lug on said frame, a lever engageable under said lug to move the
45 frame, an electromagnet for actuating the lever, a traveling work-carrier, contacts on said carrier, and stationary contacts cooperative for controlling the flow of current to
50 said magnet.

8. In a machine of the character described, the combination of a grinding wheel spindle, and means for imparting thereto a compound movement of rotation and reciproca-
55 tion, said means including a means for rotating said spindle, an axially reciprocable sleeve for carrying a grinding wheel, said sleeve being in splined relation with said spindle, and means for converting the rota-
60 tive motion into reciprocative motion for reciprocating said sleeve while rotating.

9. In a machine of the character described, the combination of a grinding wheel spindle, and means for imparting thereto a compound movement of rotation and reciproca-

tion, said means including a means for rotating said spindle, a sleeve in splined relation with said spindle for carrying a grinding wheel, a cam on said sleeve, and power driven
70 means for actuating said cam to reciprocate said sleeve axially with respect to said spindle during rotation.

10. In a machine of the character described, the combination of a grinding wheel spindle, and means for imparting thereto a
75 compound movement of rotation and reciprocation, said means including a means for rotating said spindle, a sleeve in splined relation with said spindle, a flange cam on said sleeve, a rotatable member having a boss en-
80 gaging said cam and cooperating therewith to reciprocate said sleeve axially with respect to said spindle during rotation, and independent power-driven means for rotating
85 said member.

11. In a machine of the character described, the combination of a rotatable spindle, a sleeve in splined relation with said
90 spindle, a flange cam on said sleeve, a rotatable member having a boss engaging said cam for moving the same and the sleeve, a grinding wheel on said sleeve, and a clamping plate for securing said grinding wheel
95 to said sleeve, said plate having a projecting dust-guard flange.

12. In a machine of the character described, the combination of a rotatable spindle, a sleeve in splined relation with said spindle, a flange cam on said sleeve, a rotatable
100 member having a boss engaging said cam for moving the same and the sleeve, a grinding wheel on said sleeve, a clamping plate for securing said grinding wheel to said sleeve, said plate having a projecting dust-guard
105 flange, and means for supplying lubricant to the associated parts through a bore in the spindle.

Signed by me this 20th day of July, 1926.

CHARLIE L. HAWES.

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