E. LOESSER.

APPARATUS FOR GRINDING PRECIOUS STONES.

APPLICATION FILED JULY 13, 1914.

1,166,843.

Patented Jan. 4, 1916.

5 SHEETS—SHEET 1.

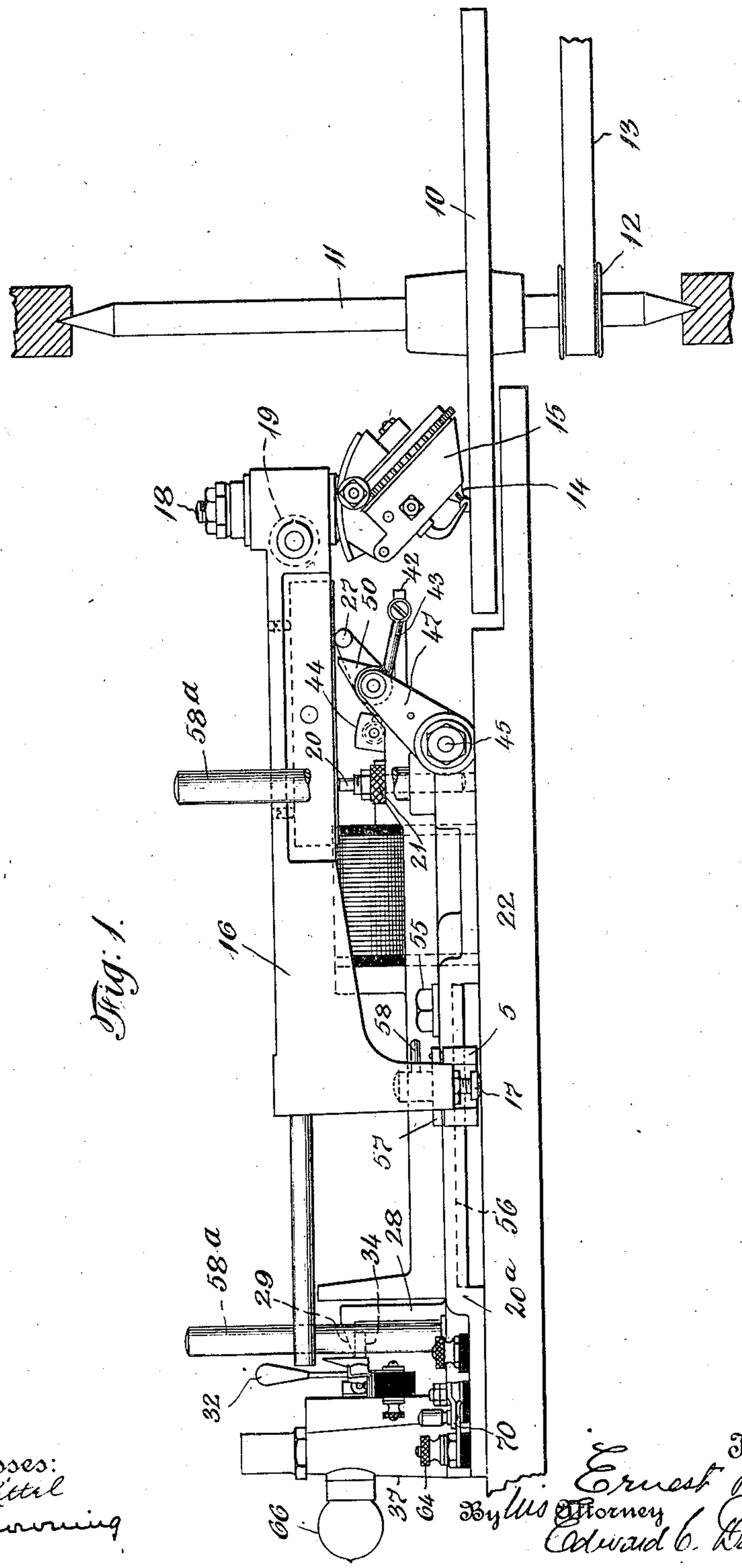

Fig. 1.

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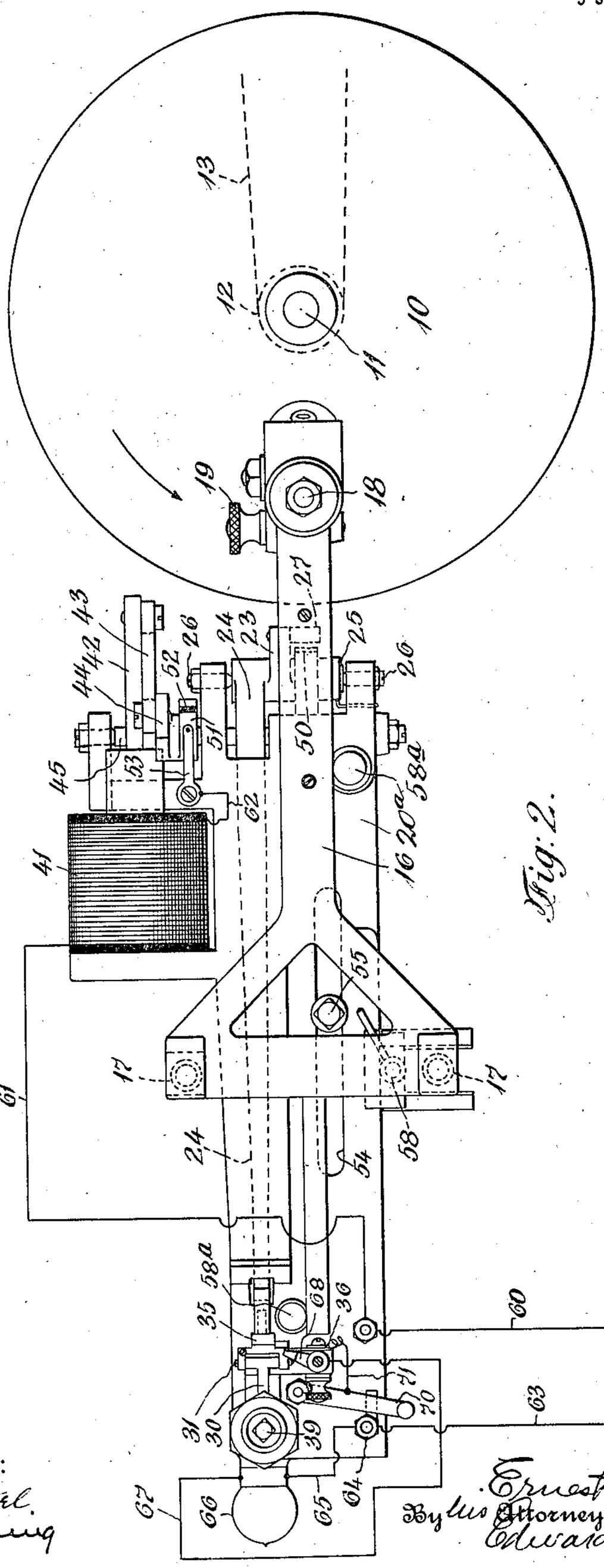

Fig. 2.

Witnesses:
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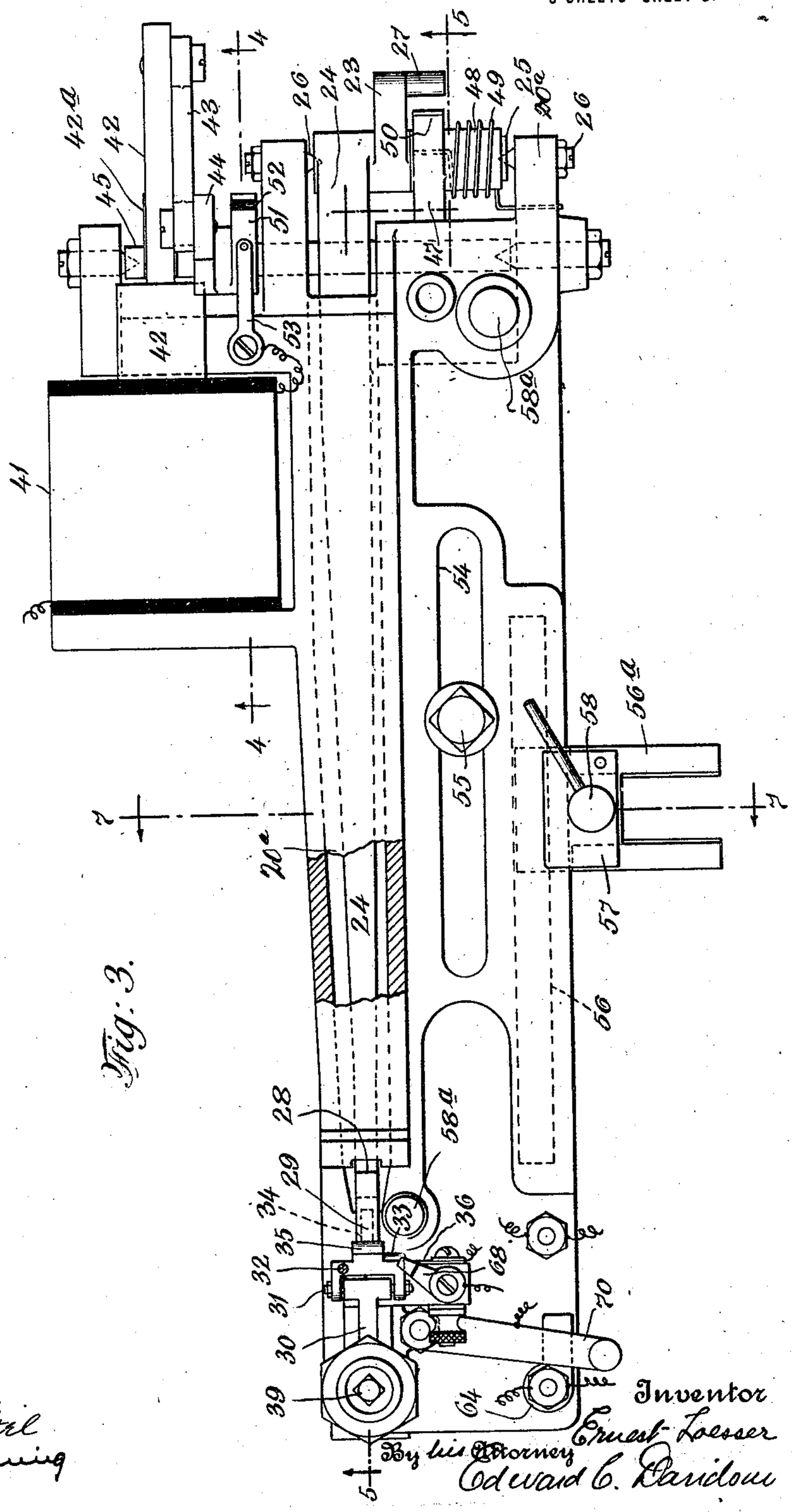

Fig. 3.

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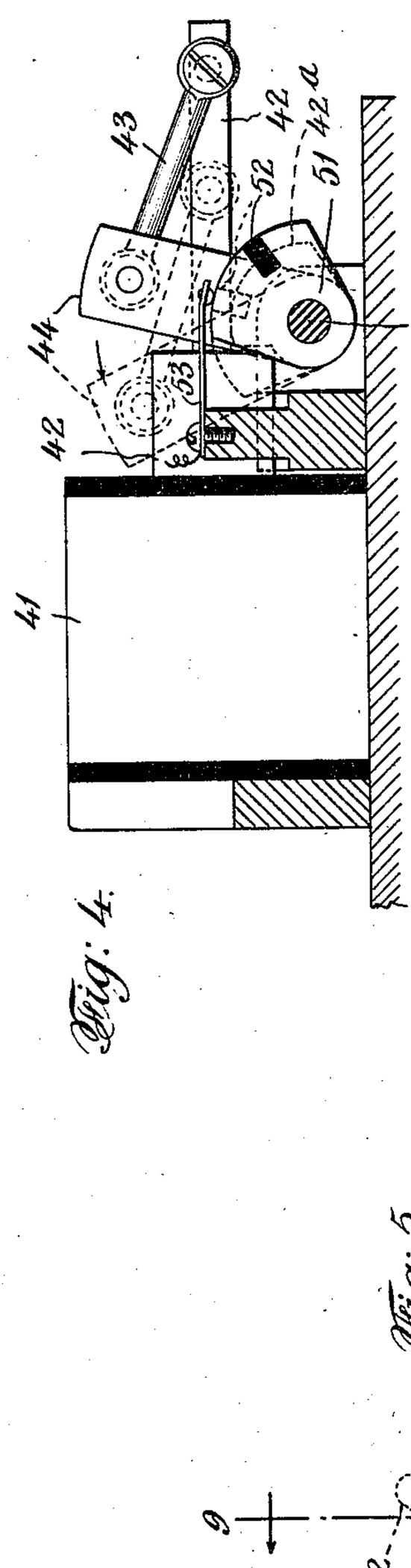

Fig. 4.

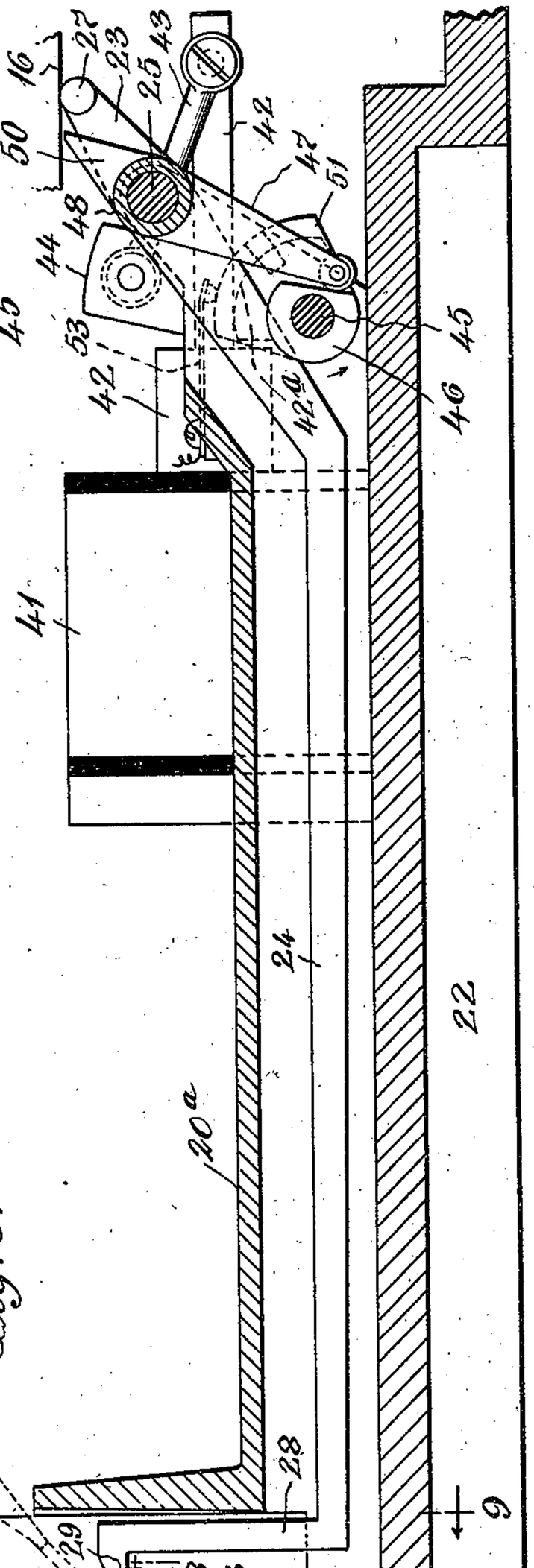

Fig. 5.

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5 SHEETS—SHEET 5.

Fig. 6.

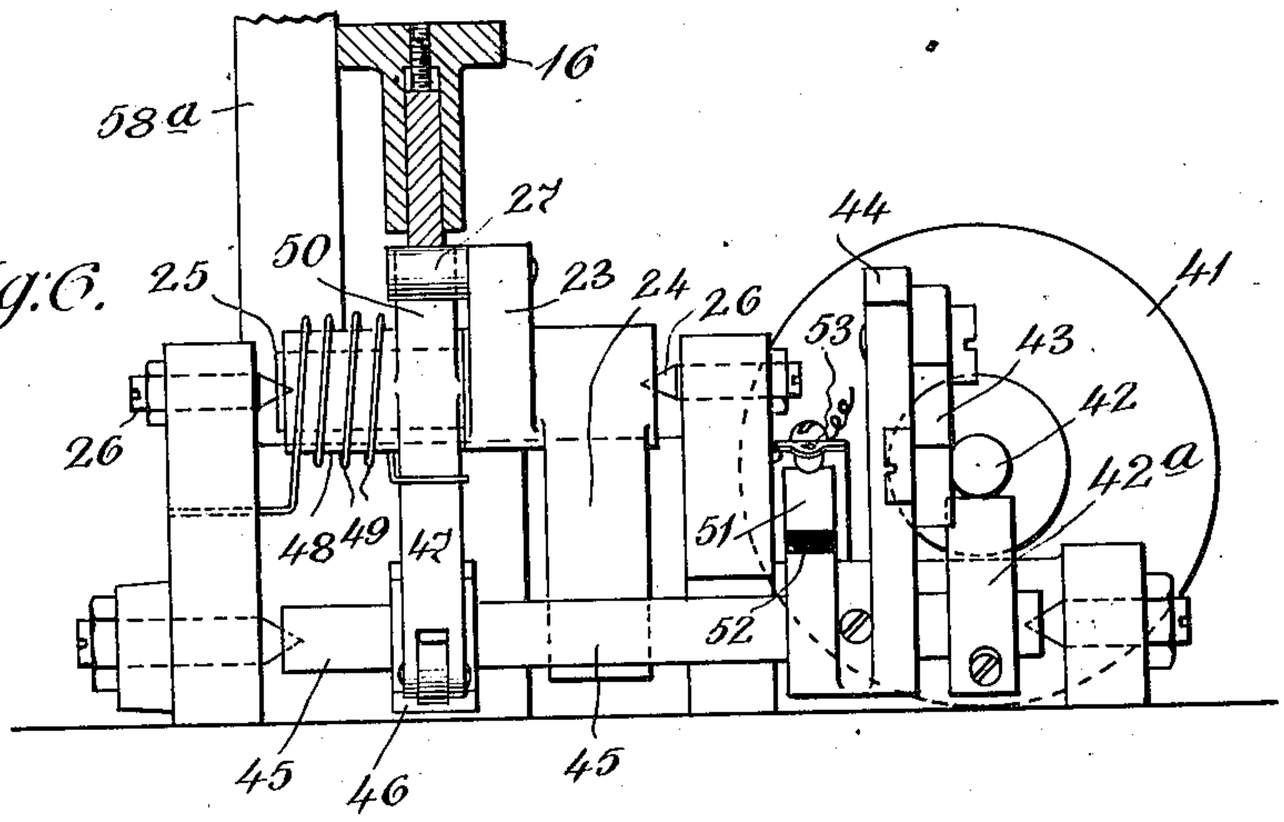


Fig. 7.

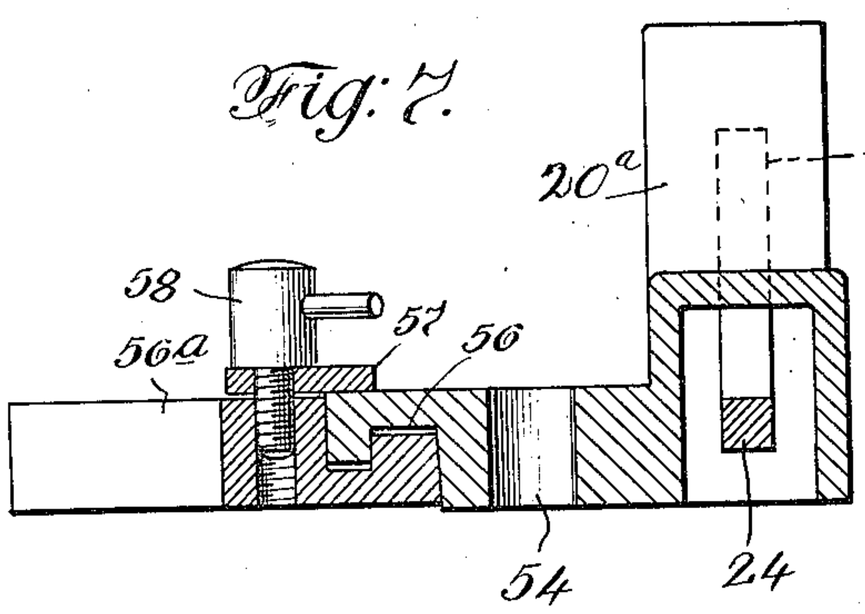


Fig. 8.

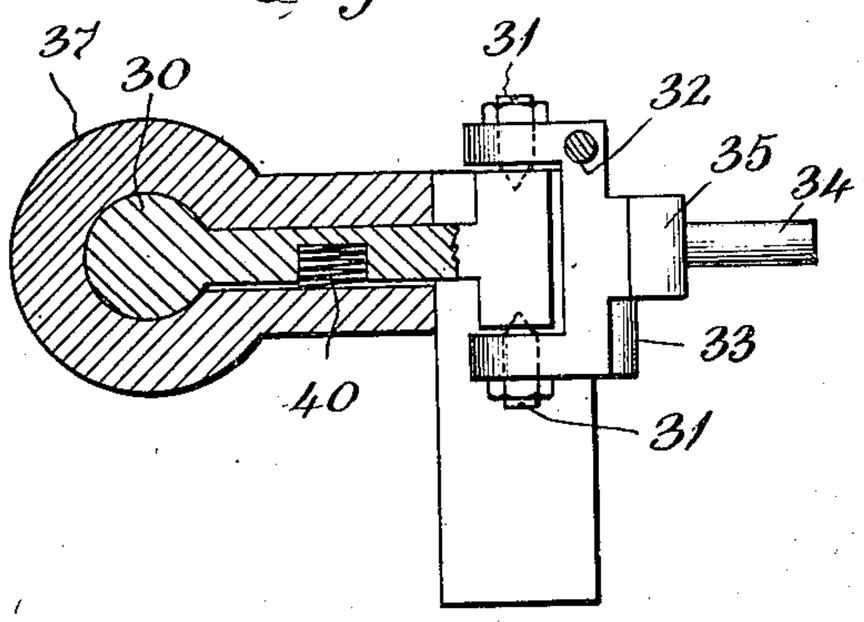
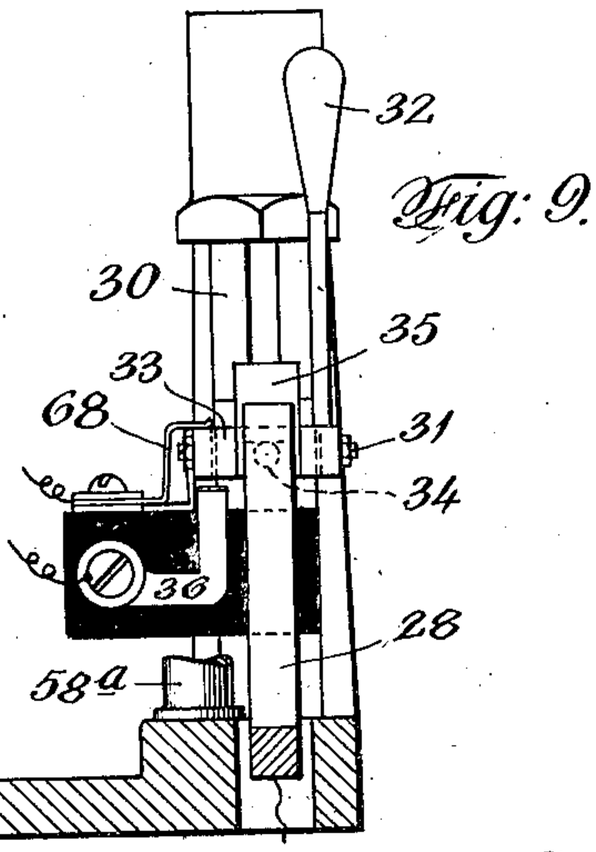


Fig. 9.



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UNITED STATES PATENT OFFICE.

ERNEST LOESSER, OF GLEN RIDGE, NEW JERSEY, ASSIGNOR TO NEW DIAMOND POLISHING TOOL COMPANY OF AMERICA, INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

APPARATUS FOR GRINDING PRECIOUS STONES.

1,166,843. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed July 13, 1914. Serial No. 850,655.

To all whom it may concern:

Be it known that I, ERNEST LOESSER, a citizen of the United States, residing in Glen Ridge, county of Essex, State of New Jersey, have invented certain new and useful Improvements in Apparatus for Grinding Precious Stones, of which the following is a specification.

This invention relates to improvements in the art of lapping precious stones, and has particular reference to a mechanism adapted to grind the facets of such stones.

One object of invention is to provide a mechanism adapted to grind the facets automatically to the exact degree required.

Another object is to secure this result without the use of highly skilled and expensive labor.

Another object is to provide a mechanism that will automatically and positively remove the stone from the lapping wheel at the instant the lapping process has been sufficiently continued.

Another object is to provide an electrically actuated device to produce this result which utilizes a quick-throw switch.

Another object is to provide means to signal the operator when a grinding operation has been completed and the mechanism requires further manipulation; and still other objects will appear in the following description and the appended claims.

Referring to the drawings: Figure 1 is a side elevation of the machine; Fig. 2 is a plan view; Fig. 3 is a plan view with parts omitted and others broken away to show certain features; Fig. 4 is a sectional elevation taken on the line 4—4 of Fig. 3; Fig. 5 is a sectional elevation taken on the line 5—5 of Fig. 3; Fig. 6 is a front elevation with parts shown in section; Fig. 7 is a sectional elevation taken on the line 7—7 of Fig. 3; Fig. 8 is a sectional plan taken on the line 8—8 of Fig. 5; and Fig. 9 is a sectional elevation taken on the line 9—9 of Fig. 5.

As shown in Fig. 1, the machine is provided with the usual lap wheel 10 mounted upon a vertical shaft 11 and driven by suitable means, as a pulley 12 and belt 13. It is further provided with a dop 14 and dop holder 15 by which the angle and number of facets to be ground upon the stone is determined. These parts are not further described as they form no part of the present invention.

The dop holder is carried by a suitable support, as a tong 16, as shown in Figs. 1 and 2, which is equipped with adjustable feet 17, 17 at its rear end resting on the bed plate 22, while its forward end carries the dop holder 15. The tong and dop holder are connected by a spindle 18 attached to the dop holder and vertically slidable in the tong, to which it may be clamped in its adjusted position by the nut 19. The weight of the tong or support and the parts carried thereby rests normally upon the two feet 17, 17 and the stone carried by the dop. In addition, however, an auxiliary and temporary rest for the tong is provided by a pin 20 vertically mounted on the frame 20^a and adjusted by a nut 21. This pin is set to hold the tong in its substantially parallel position to the machine bed 22 and lap wheel 10 during the adjustment of parts to be subsequently described.

Devices coöperating with the tong to determine its movements include a detector mechanism actuated by the movement of the tong, and a detector controlled mechanism for elevating the tong.

The detector mechanism is best shown in Figs. 2, 3 and 5, and comprises an angle lever having a short arm 23 and a long arm 24, each pinned to a shaft 25 journaled on pivots 26, 26, carried by the frame. The short arm is provided with an offset pin 27 located below and in the path of the tong, as shown. The long arm extends to the rear of the machine and terminates in a vertical extension 28 and latch lug 29. The latch lug and arm 24 are normally supported by a drop switch, as best shown in Fig. 5.

The drop switch is pivoted to a vertically movable block 30 at the point 31 and includes a handle 32, a contact cam 33, a horizontal projection 34 supporting the latch 29, a vertical projection 35 resting against the end of the latch lug 29 to hold the switch open and a contact terminal 36 fastened to and insulated from the block 30. The block 30 carrying the switch as shown in Figs. 5 and 8 is mounted in a vertical guideway 37 at the rear end of frame 20^a and is supported by a spring 38. A vertically disposed adjusting screw 39 at the upper part

of the guide-way 37 bears on the top of block 30, to act in conjunction with spring 38 to adjust said block. To provide against lost motion or any lateral play of the block 30 and at the same time preserve its ease of adjustment, a lateral spring 40 is inserted in a recess in the block 30, as shown in Fig. 8 and bears against the adjacent wall of the guide-way, giving the block a smooth frictional contact with the other guide wall so that it is held steady at all times.

In the operation of the detector mechanism, the contact of the descending support with the pin 27, as the stone is ground away, elevates the rear end 28 of the arm 24, the latch 29 rising above the extension 35 of the switch, permitting the latter to fall forward by gravity to the dotted line position shown in Fig. 5, in which position the switch cam 33 contacts with the terminal 36, closing a circuit which controls the tong elevating mechanism. This elevating mechanism is best shown in Figs. 3, 4, 5 and 6, and comprises a solenoid 41 attached to the frame 20^a, a plunger 42 connected by a pivoted link 43 to an arm 44 pinned to shaft 45. Upon shaft 45 is a segment 42^a arranged beneath the extension of the plunger to which the link 43 is connected and which is adapted to support the weight of the plunger 42.

The energizing of the solenoid causes the arm 44 to move to the left as shown in Fig. 4, rocking the shaft 45 anti-clockwise. Upon the shaft 45 is a cam 46 coacting with a follower arm 47 attached to a sleeve 48 carried by shaft 25 and a spring 49 surrounding the sleeve operates to keep the follower arm in contact with the cam. The arm is further provided with a camming extension 50 which contacts with an adjustable plate 50^a carried by the tong and elevates the tong when the arm is rocked by the cam 46. The shaft 45 carries also a commutator sector 51 provided with an insulating segment 52, and which is in contact with a brush terminal 53 of the solenoid 41.

The mechanism as a whole is adjustably mounted as shown in Figs. 1, 3 and 7, the frame 20^a being slotted as at 54 so that it may be held adjustably to the bed by bolt, as at 55. The frame is equipped with ways 56 upon which the guide 56^a for one of the tong feet is slidable, the guide being clamped in the desired position by plate 57 and screw 58. As shown in Figs. 1 and 2, cylindrical members 58^a, extending upwardly from the frame 20^a, are provided to prevent lateral movement of the tong during the lapping operation.

The electric connections are best shown in Fig. 2 in which the battery is represented at 59 and is connected to the solenoid 41 by conductors 60, 61. From the solenoid the circuit runs from terminal 62 to brush 53, sector 51 to the ground. The second battery connection 63 divides at switch point 64, one path being through the conductor 65, the signaling device, as a lamp 66, wire 67, brush 68 in continuous contact with the drop switch hub which is grounded, and the other path being through switch blade 70, wire 71 and terminal 36. By these connections and the drop switch previously described, it will be seen that when the sector 51 and the brush 53 are in electrical contact, a relatively small current flows continuously through the solenoid and the lamp, as they are in single circuit, lighting the lamp but not affecting the solenoid; that if the switch 70 be closed and the drop switch is tripped, the cam 33 will ground the terminal 36 placing the lamp and solenoid in multiple circuit, whereby the greater part of the current will flow from the battery directly through the solenoid and energize the elevating mechanism; and that with the movement of the latter mechanism, the anti-clockwise movement of the sector 51 will bring the insulated segment 52 under the brush 53, breaking both the lamp and the solenoid circuits.

The first facet of a set or series of facets of the stone, which is suitably held by the dop with the dop holder set at the requisite angle, is ground or polished to the desired size with the tong 16 set in horizontal position, the tong then being supported by the feet 17 and the stop 20, adequately adjusted, with the stone in contact with the lap. The first facet may of course have been otherwise previously ground, and with its dop set in the apparatus with the parts thereof adjusted as described. The pin 27 of the short arm of the detector, or tong raising mechanism controller, will now be in contact with the adjustable plate of the tong and with the rear end of the long arm 24 of the detector in raised position. The drop switch is then vertically adjusted so that the top of the projection 35 will just pass under the end of the latch lug 29, thus providing a knife-edge escapement for the drop switch. When the stone is set for another facet to be formed by the lap the front end of the tong will of course be raised and be out of contact with the pin 27; the drop switch is now in open position, as shown by the full lines in Fig. 5, and is so held by the latch 29, resting on the projection 34, with its end against the front face of the projection 35. The plunger or armature 42 of the solenoid 41 is at this time set in outer position, as shown in Figs. 2, 4 and 5, and the current from battery 59 flowing through the solenoid and the lamp 66 in single circuit insufficiently energizes the solenoid to cause it to act on its plunger but lights the lamp. Now when the facet is ground away to the same depth as the previously ground facet the tong has assumed its original set posi-

tion and the latch 29 releases the drop switch, thus changing the circuit to place the solenoid and lamp in multiple, and with the switch 70 closed the lamp 66 is short circuited and by its extinguishment notifies the attendant that the grinding operation is completed. Practically all of the current now flows through the solenoid, which, drawing in the plunger 42, causes the tong to be raised through the medium of the camming device 50, as before described, and so vertically lifts the stone away from the lap. By the time the device 50 has moved into practically vertical position under the tong, and so holds it up, the insulating block 52 has moved to the brush terminal 53, thus breaking the circuit, leaving all the stone controlling parts of the apparatus in inactive condition, to be again set for another facet grinding or polishing operation; in doing this the arm 44 is set as shown in full lines in Fig. 4 and the drop switch raised to break the circuit through the switch 70 and hold the detector, by its latch 29, in active position. If the parts actuated by the solenoid be set before the drop switch is raised the switch 70 should then be open.

It is obvious that many changes may be made in the mechanism disclosed without departing from the spirit and scope of the invention, and I do not limit myself to the particular mechanism disclosed, this being but a particular embodiment of my invention and illustrative thereof.

What is claimed:

1. A precious stone grinding and polishing machine, comprising a lap on which the stone bears, a bed-plate, a tong having one end resting on the bed-plate and having at its opposite free end a movement toward and from the lap, a stone holding device connected with the free end of the tong to move gradually therewith toward the lap as the grinding operation proceeds and to move quickly with the tong away from the lap when the grinding operation is completed, normally inactive means for raising the free end of the tong and the stone holding device simultaneously away from the lap and devices operating automatically on completion of a facet-forming operation to bring said lifting means into active operation.

2. A precious stone grinding and polishing machine, comprising a lap on which the stone bears, a tong or support, one end of which has a free movement toward and from the lap, a stone-holding device connected to move coincidentally with the free end of the tong toward and from the lap, normally inactive means for raising the free end of the tong and the stone-holding device away from the lap and devices operating automatically on the completion of a facet-forming operation to bring said raising means into active operation to raise the free end of the tong and thus withdraw the stone from the lap.

3. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, means for automatically raising the support to move the stone vertically away from the lap upon the completion of a facet forming operation and a signal device operated in conjunction with the support raising means.

4. A precious stone grinding and polishing machine, comprising a lap, a tong having a free end adapted to move toward and from the lap, a stone-holding device carried by the free end of the tong and adapted to move coincidentally therewith, a swinging arm having a part acting on the under side of the tong to raise the latter, normally inactive means for actuating said arm to raise the tong and a tripping device engaging the tong and operating when the latter has been depressed to a sufficient extent to bring the raising means into active operation.

5. A precious stone grinding and polishing machine, comprising a lap on which the stone bears, a movable support mounted in the frame of the machine, a stone-holding device carried by the support, means operating to raise the support and to move the stone vertically away from the lap upon the completion of a facet-forming operation, normally inactive electromagnetic devices for operating said raising means and devices operated by the descent of the support to bring said electromagnetic devices into active operation when a facet is completed.

6. A precious stone grinding and polishing machine, comprising a movable support, a stone-holding device carried by the support, a lap on which the stone bears, means for automatically raising the support to move the stone vertically away from the lap and a locking device for holding the support in its raised position after the completion of each facet-forming operation.

7. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, a swinging arm adapted to act on the underside of the support and means including an electric motor device and a switch, actuated from the support, for automatically moving the arm to raise the support and lock it in raised position with the stone away from the lap.

8. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, a swinging arm adapted to act on the underside of the support, means including an electric motor device and a switch, actuated

from the support, for automatically moving the arm to raise and hold the support with the stone away from the lap and a signal lamp in circuit with the electric motor.

9. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, a swinging arm adapted to act on the underside of the support, means including an electric motor device and a switch, actuated from the support, for automatically moving the arm to raise and hold the support with the stone away from the lap and a detector acted upon by the support for controlling the switch.

10. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, a swinging arm adapted to act on the underside of the support, means including an electric motor device and a quick acting switch for automatically moving the arm to raise the support and hold the stone away from the lap and a detector acted upon by the support and having a knife edge connection with the switch whereby the switch is suddenly released to become closed and cause the motor to be adequately energized.

11. In a precious stone grinding and polishing machine, a stone holder, a lap, a source of electricity, an electric motor device adapted to move the stone holder away from the lap and means for causing the electric motor to become active when a facet of the stone has been duly ground or polished.

12. In a precious stone grinding and polishing machine, a stone holder, a lap, a source of electricity, an electric motor device adapted to move the stone holder away from the lap, a signal lamp in circuit with the electric motor and means for causing the electric motor to become active when a facet of the stone has been duly ground or polished.

13. In a precious stone grinding and polishing machine, a stone holder, a lap, a source of electricity, an electric motor device adapted to move and hold the stone holder away from the lap, means for causing the electric motor to become active when a facet of the stone has been duly ground or polished and means controlled by the electric motor for opening the motor circuit after the stone holder is raised.

14. In a precious stone grinding and polishing machine, a stone holder, a lap, a source of electricity, an electric motor device adapted to move the stone holder away from the lap, a signal lamp in circuit with the electric motor during the grinding operation and means for setting the motor and lamp in multiple circuit, whereby the motor is adequately energized to raise the stone holder and the lamp current reduced to inefficiency.

15. In a precious stone grinding and polishing machine, a stone holder, a lap, a source of electricity, an electric motor device adapted to move the stone holder away from the lap, a signal lamp in circuit with the electric motor during the grinding operation, means for setting the motor and lamp in multiple circuit, whereby the motor is adequately energized to raise the stone holder and the lamp current reduced to inefficiency and means controlled by the motor to open the circuit after the stone holder is raised.

16. A precious stone grinding and polishing machine, comprising a tong, a stone holding device carried by the tong, a lap on which the stone bears, a swinging arm adapted to act on the underside of the tong, means including an electric motor device and a switch, actuated from the tong, for automatically moving the arm to raise the tong and hold the stone away from the lap and a signal lamp in circuit with the electric motor during the grinding operation and placed in multiple with the motor when the switch is closed, whereby the motor becomes adequately energized to raise the tong and the lamp current reduced to inefficiency.

17. A precious stone grinding and polishing machine, comprising a tong, a stone holding device carried by the tong, a lap on which the stone bears, a swinging arm adapted to act on the underside of the tong, means including an electric motor device and a switch, actuated from the tong, for automatically moving the arm to raise the tong and hold the stone away from the lap, a signal lamp in circuit with the electric motor during the grinding operation and placed in multiple with the motor when the switch is closed, whereby the motor becomes adequately energized to raise the tong and means controlled by the motor to open the lamp and motor circuits after the tong is raised.

18. In combination with a movable supporting means or tong, an electrically actuated means adapted to raise said supporting means, a swinging switch in the electric circuit and a detector device adapted to hold the switch open and to be acted upon by the supporting means when said means has moved a predetermined distance, to release the switch to close the circuit.

19. In combination with a movable supporting means or tong, an electrically actuated means adapted to raise said supporting means, a swinging self-closing switch in the electric circuit and a detector device adapted to hold the switch open, to be held in operative position by the switch and to be acted upon by the supporting means when said

means has moved a predetermined distance, to release the switch to close the circuit.

20. In combination with a movable supporting means or tong, an electrically actuated means adapted to raise said supporting means, a drop switch in the electric circuit and having a vertical and a lateral extension, a lever having one of its ends resting on the lateral extension and bearing against the vertical extension of the switch and having its other end in the path of the movable supporting means, whereby said lever is actuated when the supporting means has moved a predetermined distance and the drop switch is freed to close the circuit.

21. In combination with a movable supporting means or tong, an electrically actuated means adapted to raise said supporting means, a swinging switch in the electric circuit, means for adjusting the supporting means, means for adjusting the switch relatively to the supporting means and a detector device adapted to hold the switch open and to be acted upon by the supporting means when said means has moved a predetermined distance, to release the switch to close the circuit.

22. A precious stone grinding and polishing machine, comprising a movable support, a stone holding device carried by the support, a lap on which the stone bears, a swinging arm adapted to act on the underside of the support, means including an electric motor device and a quick acting drop switch for automatically moving the arm to raise the support and hold the stone away from the lap, a lever held in normal operative position by the switch and holding the switch in open position and also adapted to be moved by the support, when said support has moved a predetermined distance, to release the switch to close the electro-motor circuit.

In testimony whereof, I have hereunto subscribed my name.

ERNEST LOESSER.

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