Oct. 7, 1930. A. P. STEINER 1,777,938

AUTOMATIC WHEEL FEED

Filed Aug. 22, 1928 2 Sheets-Sheet 1

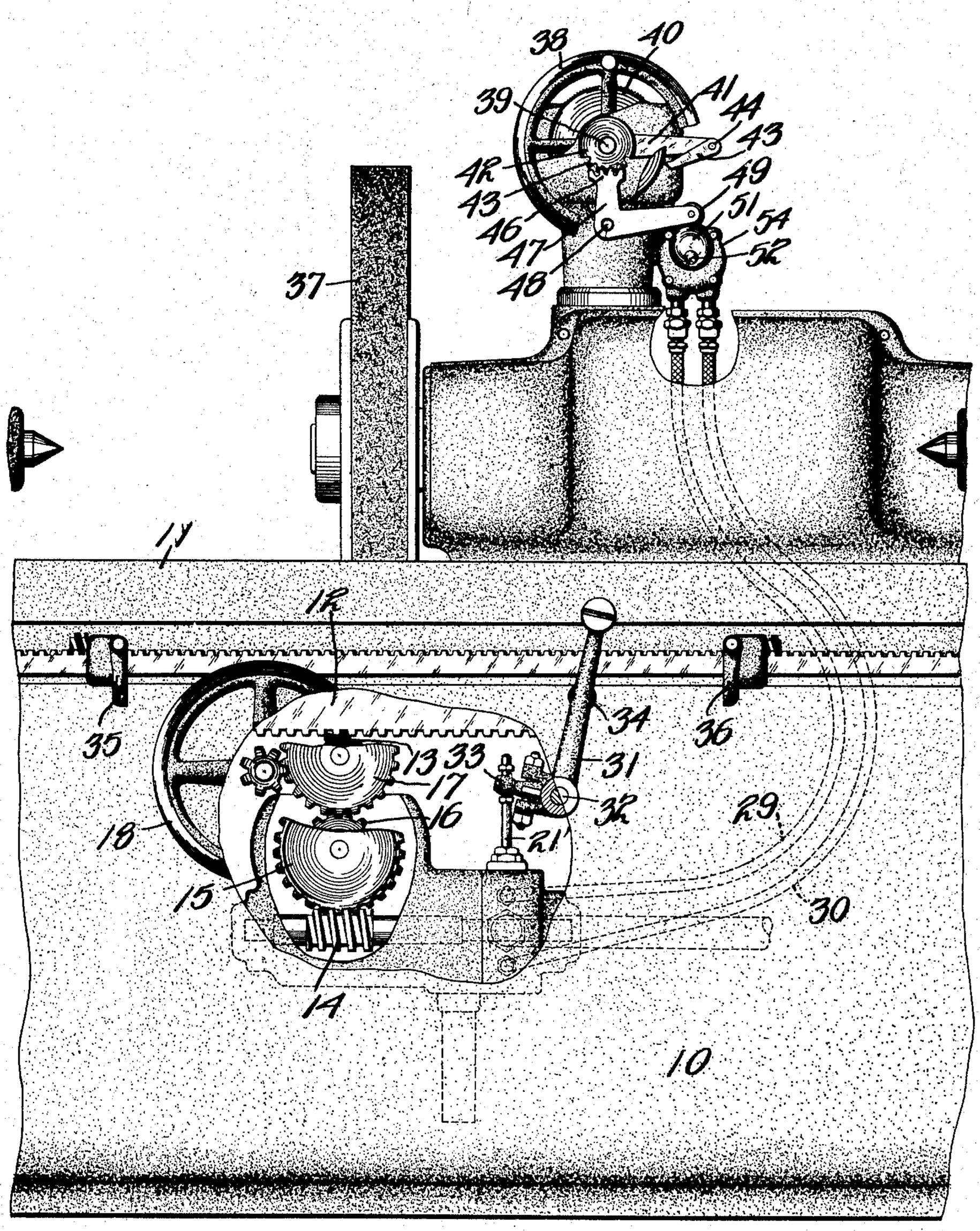

Fig. 1

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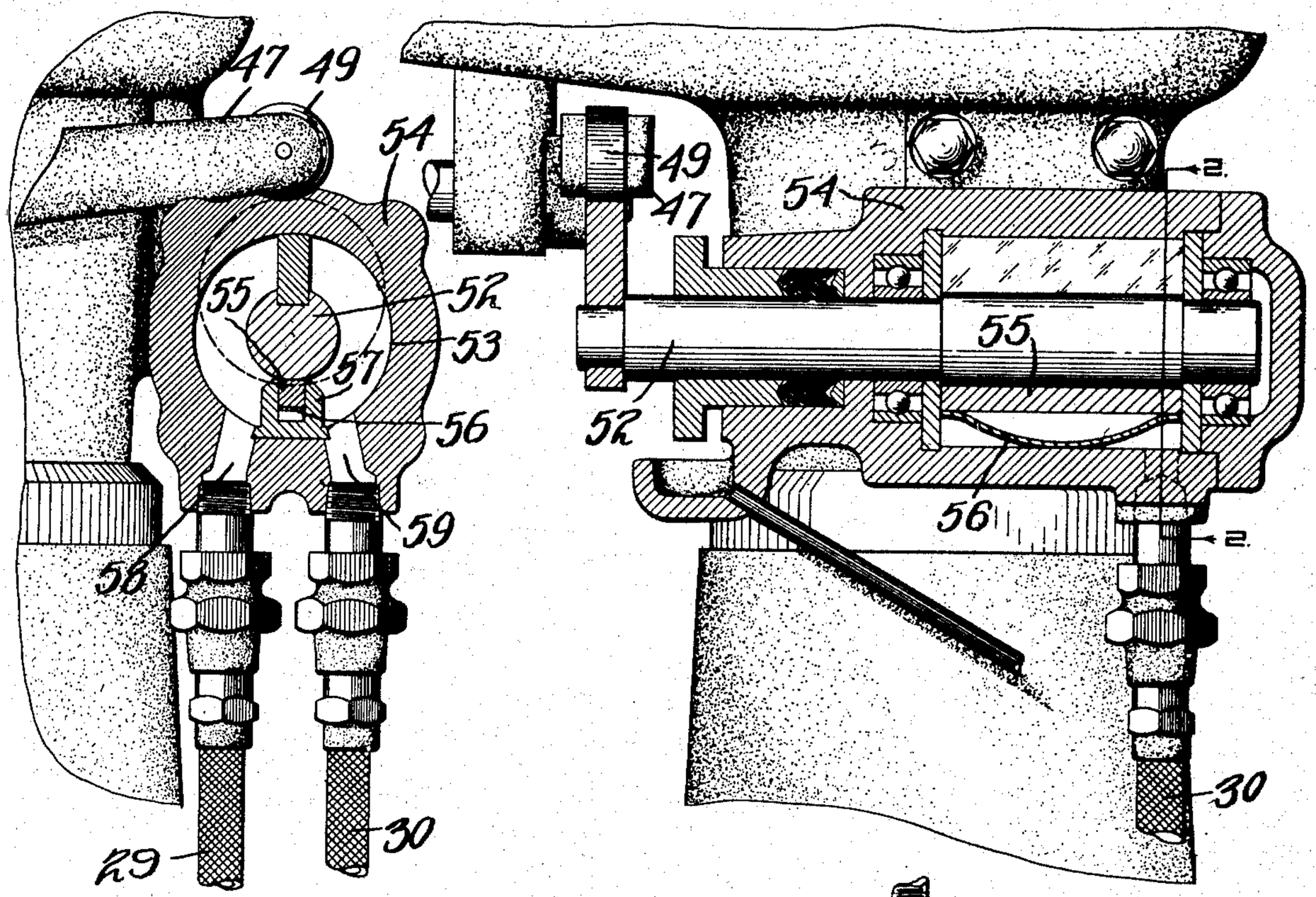

Fig. 2

Fig. 3

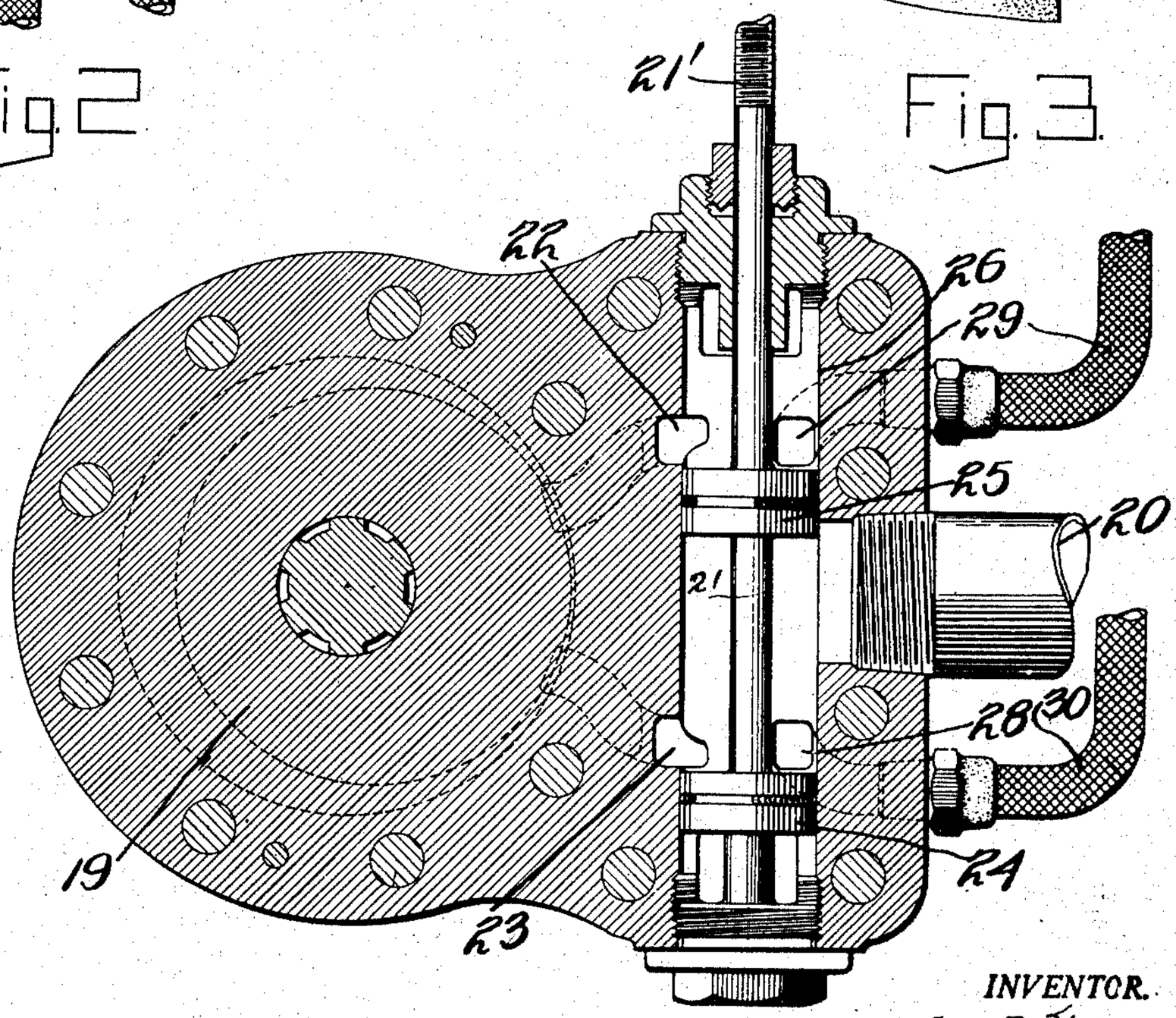

Fig. 4

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Patented Oct. 7, 1930 1,777,938

UNITED STATES PATENT OFFICE

AMOS P. STEINER, OF WAYNESBORO, PENNSYLVANIA, ASSIGNOR TO LANDIS TOOL COMPANY, OF WAYNESBORO, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA

AUTOMATIC WHEEL FEED

Application filed August 22, 1928. Serial No. 301,367.

This invention relates to devices for automatically feeding a working rotary tool toward the work, and more particularly to devices for feeding the grinding wheel of a grinding machine toward the work a predetermined distance at the end of each stroke of the work carriage.

It is an object of the invention to provide means whereby the said device may be connected to and co-operate with the motor which operates the work carriage.

A further object is to provide hydraulically operated means co-operating with the motor for driving the work carriage and connected to the mechanism for feeding the grinding wheel toward the work.

In the usual automatic wheel feed mechanism which co-operates with the movement of the work carriage there is a mechanical connection of some sort actuated by the work carriage or the reversing wheel for feeding the grinding wheel toward the work. Such an arrangement not only takes up valuable space on the machine but is very non-flexible in operation. The improvement forming the subject matter of this invention consists of an hydraulic motor fixed to the cover of the wheel feed shaft and connected to the traverse motor of the work carriage by means of flexible fluid connections extending directly through the wheel base and the bed of the machine. This provides for an operative connection between the motor of the work carriage and the wheel feed which takes up very little space on the machine, and which provides a most flexible operative connection between the motor which operates the work carriage and the mechanism which operates the feeding of the grinding wheel toward the work.

Referring to the accompanying drawings which are made a part hereof and on which similar reference characters indicate similar parts,

Figure 1 is a partial front elevation of a grinding machine with parts broken away to show the traverse mechanism and the connection between the traverse motor and the wheel feed mechanism,

Figure 2 is a sectional front elevation taken on line 2—2, Figure 3, showing the oscillating motor which actuates the wheel feed mechanism,

Figure 3 is a section on a line 3—3 of Figure 2, and

Figure 4 is a sectional end elevation of a traverse motor showing the reversing valve and the connections to the wheel feed oscillating motor of Figure 2.

In the drawings numeral 10 indicates the bed of a grinding machine having mounted thereon a reciprocating carriage 11. The carriage 11 is reciprocated by means of a rack 12 secured therebeneath and moved by means of a pinion 13 driven through worm 14 and gears 15, 16 and 17 in a well known manner. A hand wheel 18 provides manual means for traversing the work carriage. The work carriage is driven by means of a fluid motor 19 operated by motive fluid delivered thereto through a pipe 20. A reversing valve 21 delivers motive fluid alternatively to the ports 22 and 23 to operate the traverse motor. The valve stem 21′ is provided with spaced pistons 24 and 25 of well known construction. The valve chamber 26 has ports 27 and 28 to which are attached flexible fluid connections 29 and 30. The ports 27 and 28 are positioned respectively adjacent the fluid admission ports 22 and 23, so that when the valve stem 21′ is moved to admit fluid through the port 22 to one side of the traverse motor 19 fluid will at the same time be delivered to the fluid connection 29 and when the valve has been shifted to admit fluid to the port 23 fluid will likewise be admitted to the fluid conduit 30. Obviously, when the fluid port 22 is open to the exhaust the fluid conduit 29 will likewise be open to the exhaust. An operating lever 31 of the reversing valve is pivotally mounted

at 32 upon the base of the machine. This lever has an arm 33 operatively connected to the upper end of the valve stem 21 for operating the valve. A lug 34 on the side of the handle lever 31 is engaged by dogs 35 and 36 at each reciprocation of the carriage. These dogs are adjustable along the carriage in a well known manner. The grinding wheel 37 is fed toward the work by means of a hand wheel 38 when manually operated. This mechanism will be described only in so far as is necessary for a full understanding of the subject matter of the instant application. The wheel 38 is mounted upon a shaft 39. This shaft also carries a ratchet wheel 40. An arm 41 secured upon a sleeve 42 has a dog 43 pivotally secured upon its outer end at 44. The hub 42 has a segmental gear 45 for engagement with a corresponding segmental gear 46 on a bell crank lever 47. This latter lever is pivotally mounted at 48 on a portion of the grinding wheel frame. The bell crank lever 47 has on its outer end a roller 49 which is engageable by a cam. This cam comprises a disk 51 eccentrically mounted upon the outer end of a shaft 52. The shaft 52 is an extension of the shaft of an oscillating motor 53. This motor consists of a casing 54 in which is mounted a motor comprising the shaft 52 and a vane 54. An abutment member 55 is held in engagement with the periphery of the shaft 52 by means of a leaf spring 56 positioned in a recess in a dividing segment 57. The motor casing is provided with ports 58 and 59 to which are connected respectively the fluid conduits 29 and 30. The operation of the device is as follows:

Assuming the valve 21 to be in the position shown in Figure 4, fluid under pressure will pass through the pipe 20, the port 23 to the traverse motor 19 and at the same time pass through the port 28, flexible connection 30, port 59 to the oscillating motor 53. Since the load on the wheel feed motor is less than that on the traverse motor, the vane 54 will be driven counter clockwise as shown in Figure 2, to oscillate the bell crank lever 47 and the arm 34 to operate the ratchet wheel 40 through a predetermined arc of rotation. The ratchet wheel 40 being connected to the shaft 39 will drive through suitable connections the mechanism for moving the grinding wheel 37 toward the work a predetermined amount. When the work carriage has moved to the right so that the dog 35 engages the lever arm 31 the reversing valve stem 21′ will be moved up to open communication between the inlet fluid pipe 20 and the port 22 of the traverse motor, and at the same time open communication with the fluid conduit 29 and the port 58 to the left chamber of the wheel feed motor as shown in Figure 2 to drive the oscillating motor clockwise as shown in Figure 2. By means of the cam 51 the rock arm 47 will again be oscillated to oscillate the arm 41 and again rotate the ratchet wheel 40 through the predetermined degree. This again moves the grinding wheel toward the work a predetermined amount. As observed above, since the wheel feed motor operates more easily than the work carriage the former will be operated before the latter. It will be further seen that the grinding wheel will be moved through a predetermined distance at each end of the traverse of the work carriage. Flexible fluid connections 29 and 30 as above stated may be arranged in the base of the machine, and since they are flexible they may be positioned in any manner found convenient to adapt them to the peculiar construction of any type of grinding machine.

While I have described my invention as applied to a grinding machine, it is to be understood that I do not limit its use to machines of this character, as obviously it may be adapted to feed any rotary cutting tool or other cutting tool toward the work in timed relation with a motor for reciprocating work past the working tool.

It will be obvious to those skilled in the art that various changes may be made in my device without departing from the spirit of the invention, and I, therefore, do not limit myself to what is shown in the drawings and described in the specification, but only as set forth in the appended claims.

Having thus fully described my said invention, what I claim as new and desire to secure by Letters Patent, is:

1. In a grinding machine having a grinding wheel, a traverse carriage and a fluid motor for traversing said carriage, means for feeding the grinding wheel toward the work comprising a shaft operatively connected to wheel feeding mechanism, a ratchet wheel on said shaft, an oscillatory shaft secured upon a sleeve, a gear segment on said sleeve, a rock arm having a gear segment engageable with the gear segment on the sleeve, a roller on the rock arm, an oscillating motor having a motor shaft extending out of the motor casing, a cam on said shaft engageable with the said roller, and flexible fluid connections from this traverse motor to the said oscillating motor whereby said wheel will be fed to the work upon operation of said traverse motor, substantially as set forth.

2. In a grinding machine having a grinding wheel, a traverse carriage and a fluid motor for traversing said carriage, means for feeding the grinding wheel toward the work comprising a shaft operatively connected to the wheel feeding mechanism, a ratchet wheel on said shaft, an oscillatory shaft secured upon a sleeve, a gear segment on said sleeve, a rock arm having a gear segment engageable with the gear segment on the sleeve, a roller on the rock arm, an oscillatory motor having a motor shaft extending out of

the motor casing, a cam on said shaft engageable with the said roller, and flexible fluid by-pass pipes leading from the ports of said traverse motor to the ports of said oscillating motor whereby said motors are connected in series to operate simultaneously, substantially as set forth.

In witness whereof, I have hereunto set my hand at Waynesboro, Pennsylvania, this 16th day of August, A. D. nineteen hundred and twenty-eight.

AMOS P. STEINER.