

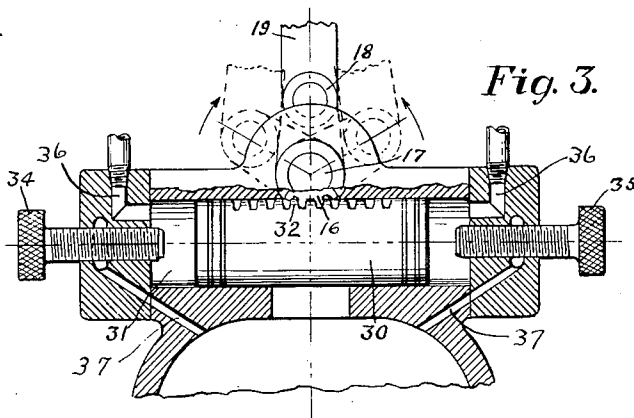
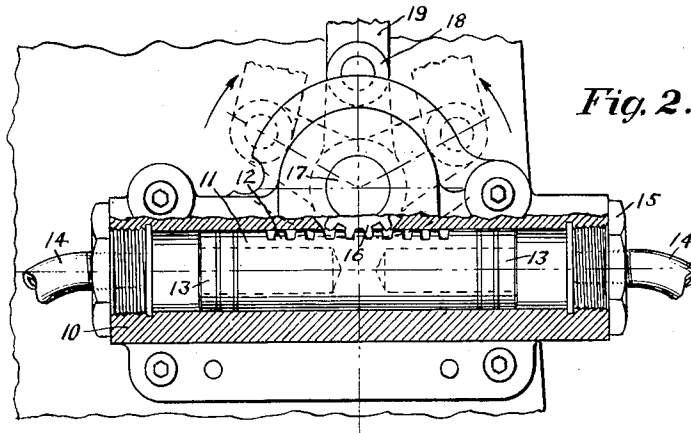
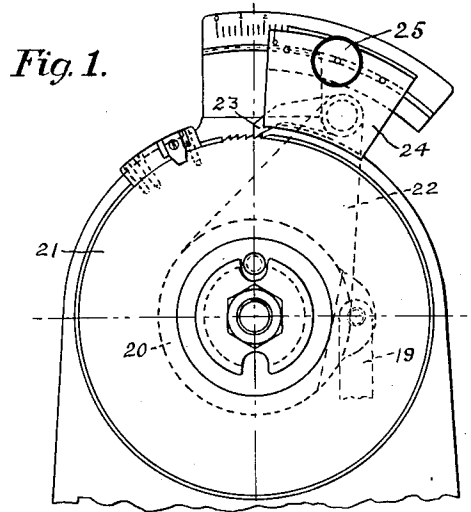
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C. KNOWLES

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FEED MECHANISM FOR MACHINE TOOLS

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INVENTOR

Carroll Knowles

BY *Joseph H. Schfield*

ATTORNEY

UNITED STATES PATENT OFFICE

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FEED MECHANISM FOR MACHINE TOOLS

Carroll Knowles, West Hartford, Conn., assignor
to Pratt & Whitney Company, Hartford, Conn.,
a Corporation of New Jersey

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This invention relates to machine tools and the like, and particularly to a means for relatively feeding an element of the machine tool and work toward and from each other. More particularly the invention relates to a wheel advancing mechanism for a hydraulically operated surface grinding machine.

An object of the present invention is to provide an improved wheel feeding mechanism for a grinding machine adapted to be actuated periodically by hydraulically operated means to advance a wheel predetermined amounts at each end of the stroke of the work supporting table.

A feature of importance of the invention is that a plunger is adapted to be moved in opposite directions within a cylinder, movement in either direction of this plunger being effected by fluid pressure supplied to one end or the other of the cylinder within which the plunger operates and serving to effect movement of a wheel advancing screw so that the wheel may be fed predetermined distances in the same direction by movement of the plunger in either direction.

Another object of the invention is to provide a member actuated by a plunger movable in opposite directions in a straight line within a cylinder, the first part of the movement of the member effecting movement of a feed wheel in its forward or feeding direction, continued movement of the linkage positioning the member for a subsequent feeding movement of the wheel in the same direction.

Another object of the invention is to provide a wheel feeding device that will not have a tendency to overrun the amount of feed movement for which it is set.

And finally it is an object of the invention to provide adjusting means for the hydraulically reciprocated members enabling the feeding movement of the wheel at opposite ends of the table movements to be independently varied.

With the above and other objects in view, my invention includes the features of construction and operation set forth in the following specification and illustrated in the accompanying drawing.

In the accompanying drawing annexed hereto and forming a part of this specification, I have shown my invention embodied in a ratchet feed mechanism for a reciprocating table grinding machine, but it will be understood that the invention can be otherwise embodied and that the drawing is not to be construed as defining or limiting the scope of the invention, the claims

appended to this specification being relied upon for that purpose.

In the drawing:

Figure 1 is a front elevation of a ratchet feed wheel and actuating pawl therefor.

Fig. 2 is a front elevation partly broken away of a hydraulically operated plunger and oscillating member for effecting movement of a pawl carrying arm, and

Fig. 3 is a view similar to Fig. 2 showing a modified form of the invention.

In the above mentioned drawing I have shown two embodiments of the invention which are now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

In the operation of grinding machines in which work mounted on a suitable table or other support and an abrasive wheel are slowly moved relatively to each other during the grinding operation to successive grinding positions, it is desirable to move the wheel or the work predetermined small distances at the ends of reciprocatory movements of the work carrying table or of the wheel. In grinding machines in which the work carrying table is moved by hydraulic means, it is desirable to employ similarly operated means, preferably forming parts of the complete hydraulic system, to operate the advancing or feeding device. Usually, and in the mechanism shown in this application, movements of the wheel to successive positions closer to the work take place upon each reversal of movement of the table.

Referring more in detail to the figures of the drawing, and first to Fig. 2, I provide a small cylinder 10 having an elongated plunger 11 movable axially therein. The cylinder 10 may be suitably mounted in fixed position upon the bed or base of the grinding machine. Into the intermediate portions of the cylindrical surface of the plunger 11 are cut a plurality of rack teeth 12. Pressure retaining devices such as cup washers 13 may be employed upon the opposite ends of the plunger 11 so that there will be no appreciable leakage of fluid from the ends of the cylinder 10. Pipes 14 are connected to the ends of the cylinder 10 preferably and as shown by means of threaded openings passing through headed screws 15 closing the ends of the cylinder 10. Fluid pressure is admitted alternately to the ends of the cylinder by any

suitable connections to the hydraulic system for the machine.

Engaging the rack 12 is a pinion 16 mounted upon a transverse shaft 17 rotatable within a fixed bearing. On this shaft 17 is an arm 18. Reciprocation therefore of the plunger 11 within the cylinder 10 will oscillate this shaft 17 and arm 18 by engagement of the teeth of the pinion 16 with the rack teeth 12 on the plunger 11. The movement of the plunger 11 is so proportioned to the pinion 16 that the shaft 17 and arm 18 will be oscillated from one position shown in dot-and-dash lines in Fig. 2 to the opposite position shown in dot-and-dash lines. This movement of the arm 18 is materially greater than an angle of 90° and preferably is approximately 120° or 130° or somewhat less than 180°. Upon the outer end of the arm 18 is a connecting rod or link 19, the opposite end of which is pivotally attached to a sleeve 20 upon the hub of a ratchet feed wheel 21 shown in Fig. 1. Oscillatory movements of the arm 18 will therefore oscillate the sleeve 20, which upon an outwardly extending arm 22 carries a pawl 23. As the radius of the sleeve 20 is materially greater than the length of arm 18 the oscillation of the arm 22 is through a smaller angle than the arm 18.

With the plunger 11 moved in either direction within the cylinder 10, the first part of the movement of the arm 18, that is until it reaches its central or mid-position, the connecting rod 19 will be moved upwardly and thus oscillate the pawl carrying arm 22 in a direction to advance the ratchet wheel 21 in its forward or feeding direction a predetermined amount. Continued movement of the plunger 11 and arm 18 beyond its mid position moves the rod 19 downward again, the arm 18 moving from one side to the other of its central or vertical position. As the sleeve 20 to which the upper end of the rod 19 is attached is of relatively large diameter compared to the vertical movement of the rod 19, the arc through which the pawl carrying arm 22 moves is relatively small. With the arm 18 at the opposite end of its movement, movement back to the initial position of the arm 18 again moves rod 19 upward during the first part of its movement. As the arm 18 approaches its mid or vertical position from either of its oblique starting positions, the upward movement of the outer end to which is attached the rod 19 is progressively slower. Regardless of the distance through which the arm 18 moves the end of the effective or feeding portion of the movement of the arm is extremely slow. Any tendency of the pawl 23 to cause overrunning of the ratchet wheel 21 is prevented.

The amount of movement imparted to the ratchet wheel 21 by the movement of the ratchet arm 22 and pawl 24 may be regulated by the provision of an adjustable shield of the usual type carried by an adjustable plate 24. This plate 24 may be locked in any number of positions, as by the locking screw 25. The movements of the oscillating arm 18, the connecting rod 19 and the pawl carrying arm 22 are always the same for a complete movement of the plunger 11 in either direction, this being sufficient to advance the ratchet wheel 21 a maximum desirable distance. To obtain smaller movements of the ratchet wheel 21 it is only necessary to adjust the position of the shield holding the pawl 23 in an inoperative position

for a part of its forward movement. As this construction of shield for varying the effective stroke of a pawl is well-known, further description is thought to be unnecessary.

In operation, upon each reversal of movement of a table or other member of the grinding mechanism, fluid pressure is admitted to one end of the cylinder 10 and exhausted from the other. The effect of the pressure admitted to one end of the cylinder is to force the plunger 11 toward the opposite end and oscillate the arm 18 through a large angle. The connecting rod 19 operated by the arm 18 is by this plunger movement given a combined lateral and axial movement. It is the axial component of this movement only which is made use of to oscillate the ratchet pawl arm 22. This axial movement takes place in opposite directions for a movement of the plunger 11 in one direction. The arm 22 carrying the pawl 24 is therefore moved forward and back with each movement of the plunger 11 in one direction.

Referring to the embodiment of the invention shown in Fig. 3, a cylinder 31 is provided similar to that shown at 10 in Fig. 2 within which operates a piston or plunger 30. Rack form teeth 32 cut into the plunger 30 engage the teeth of a pinion 16 in every way similar to that shown in Fig. 2. This pinion 16, its shaft 17, arm 18 operate similarly to the same parts shown in Fig. 2. At opposite ends of the cylinder 31 are screws 34 and 35 which may be adjusted to positions limiting the movement of the piston 30. With the screws 34 and 35 adjusted to an inner position, the piston 30 and therefore the arm 18 will start from a different oblique position, thus reducing the upward movement of the rod 19 and advancing movement of the pawl 23. The screws 34 and 35 may be adjusted to different positions so that the arm 18 will be oscillated to different oblique positions upon opposite sides of its central position. The vertical movement of the rod 19 will therefore be unequal from these different oblique positions of the arm 18 and consequently the pawl 23 will be moved different amounts by movements of the piston 30 in opposite directions. By suitable individual adjustments of the screws 34 and 35 the feeding or advancing movement of the pawl 23 may be made any amount desired at the opposite ends of the table movement.

The fluid operating the piston 30 within cylinder 31 may be admitted through suitable supply conduits 36 extending through the heads of cylinder 31. Drain conduits 37 permit fluid passing portions of the screws 34 and 35 to be returned to the supply.

What I claim is:

1. Feeding mechanism for a machine tool comprising in combination, a cylinder having means to admit fluid pressure to the opposite ends thereof, a plunger movable within said cylinder, rack teeth on said plunger, a shaft having a pinion thereon engaging said rack whereby said shaft is oscillated by movement of said plunger, an arm on said shaft oscillated therewith, a ratchet carrying member actuated up to a predetermined position and back again by movement of said arm in either direction and a feed wheel actuated by said ratchet member.

2. Feeding mechanism for a machine tool comprising in combination, a cylinder having means to admit fluid pressure thereto at its opposite ends, a plunger movable within said cylinder,

	rack teeth on said plunger, a shaft having a pinion thereon engaging said rack whereby said shaft is oscillated by movement of said plunger, an arm on said shaft oscillated by said plunger,	adjusting means, and a pawl carrying member actuated in opposite directions by a single movement of said plunger in either direction.
5	a connecting rod attached to the free end of said arm, movement of the plunger in one direction oscillating the arm to give the connecting rod an axial to and fro movement, and ratchet feed means actuated by said axial movement of said connecting rod.	4. Feeding mechanism for a machine tool comprising in combination, a cylinder, a plunger movable axially therein, fluid pressure means to actuate said plunger, means to adjust the movement of said plunger at opposite ends of said cylinder, an arm oscillated to opposite oblique positions by said plunger the amount of oscillatory movement on each side of its central position being controlled by said plunger adjusting means at one end of the plunger cylinder, and a pawl carrying member actuated in opposite directions by a single movement of said plunger in either direction.
10	3. Feeding mechanism for a machine tool comprising in combination, a cylinder, a plunger movable axially therein, fluid pressure means to actuate said plunger, means to adjust the movement of said plunger at opposite ends of said cylinder, an arm oscillated to opposite oblique positions by said plunger the amount of oscillatory movement being controlled by said plunger	
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