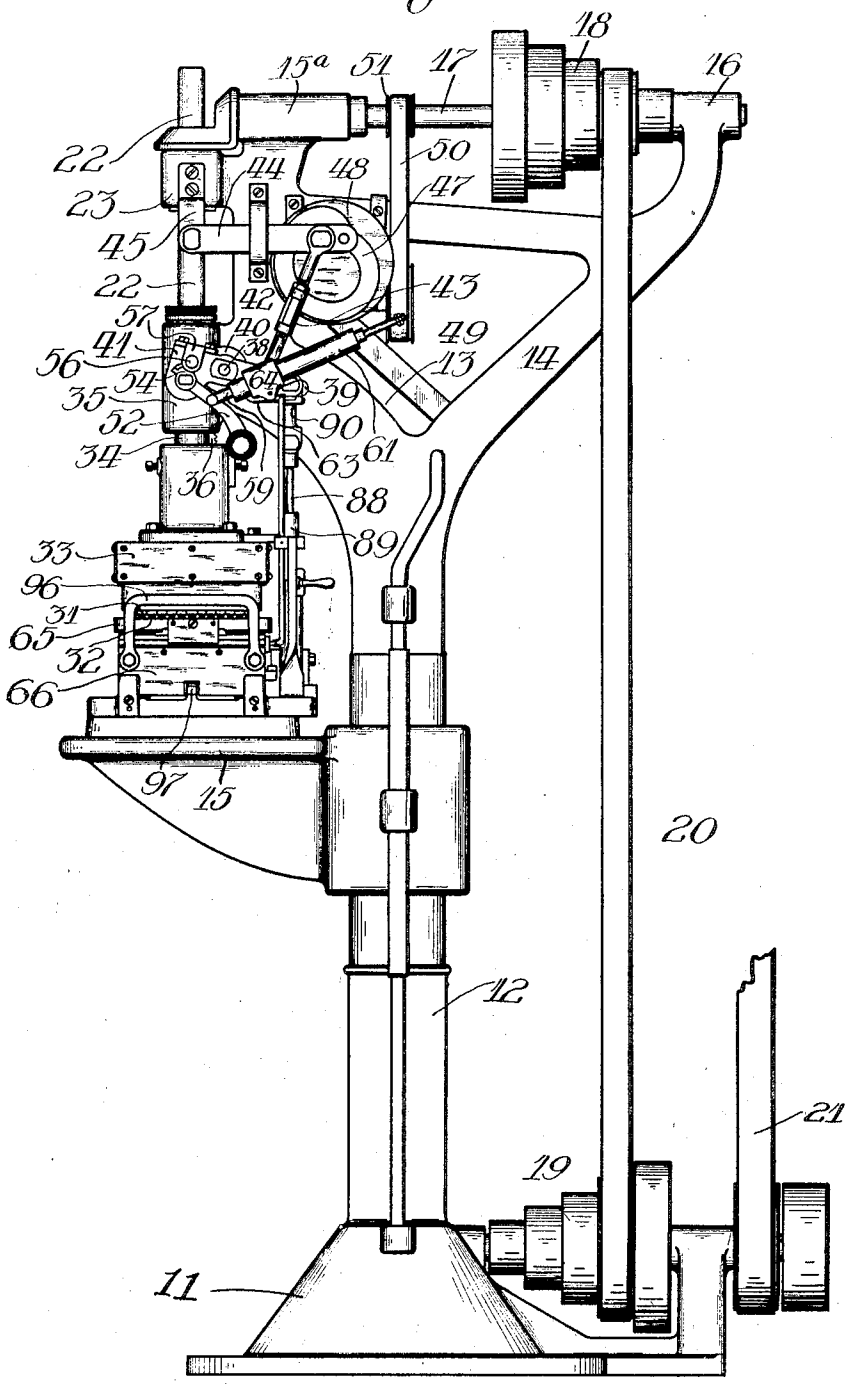
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Fig. 1.



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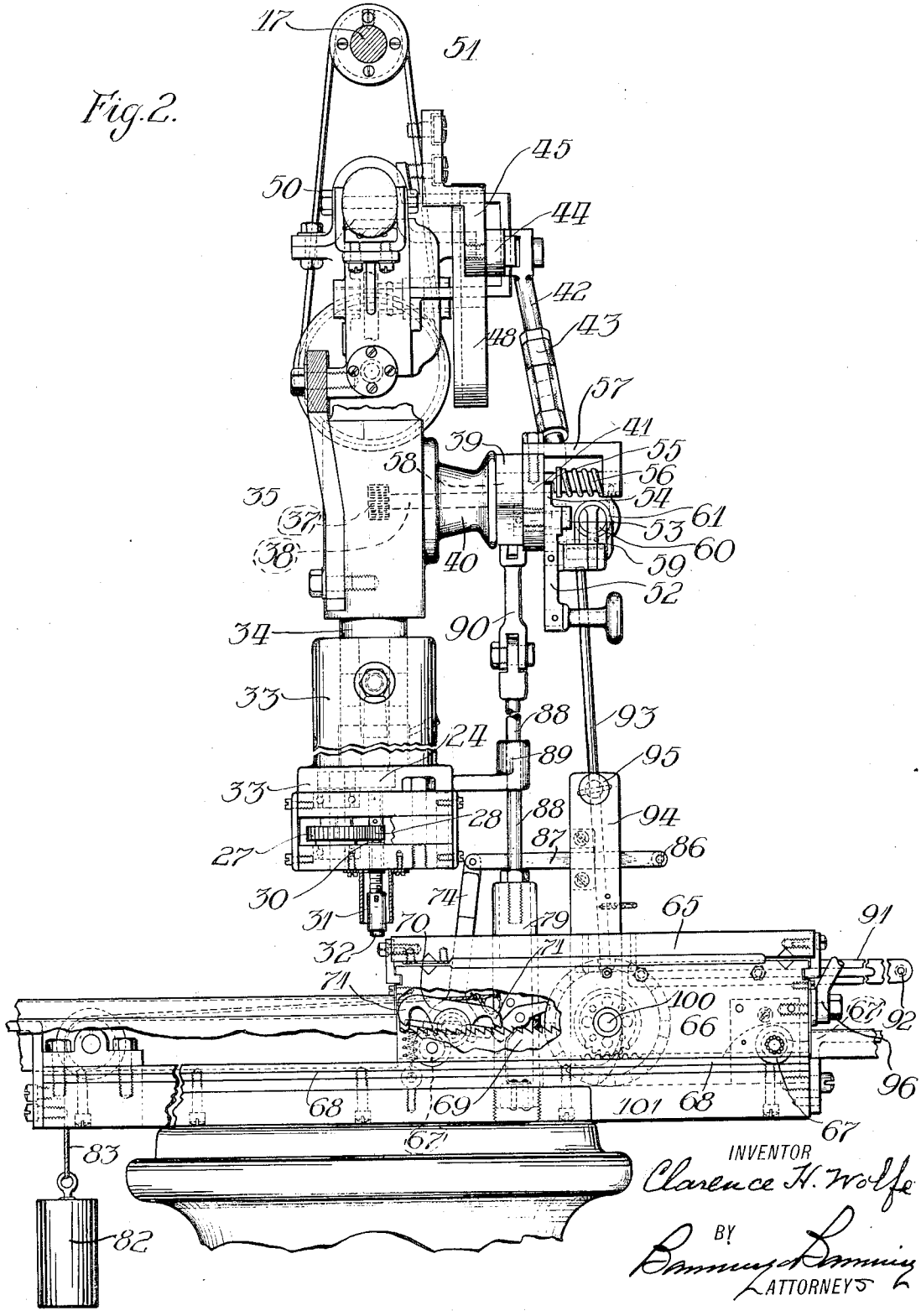
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Fig. 2.



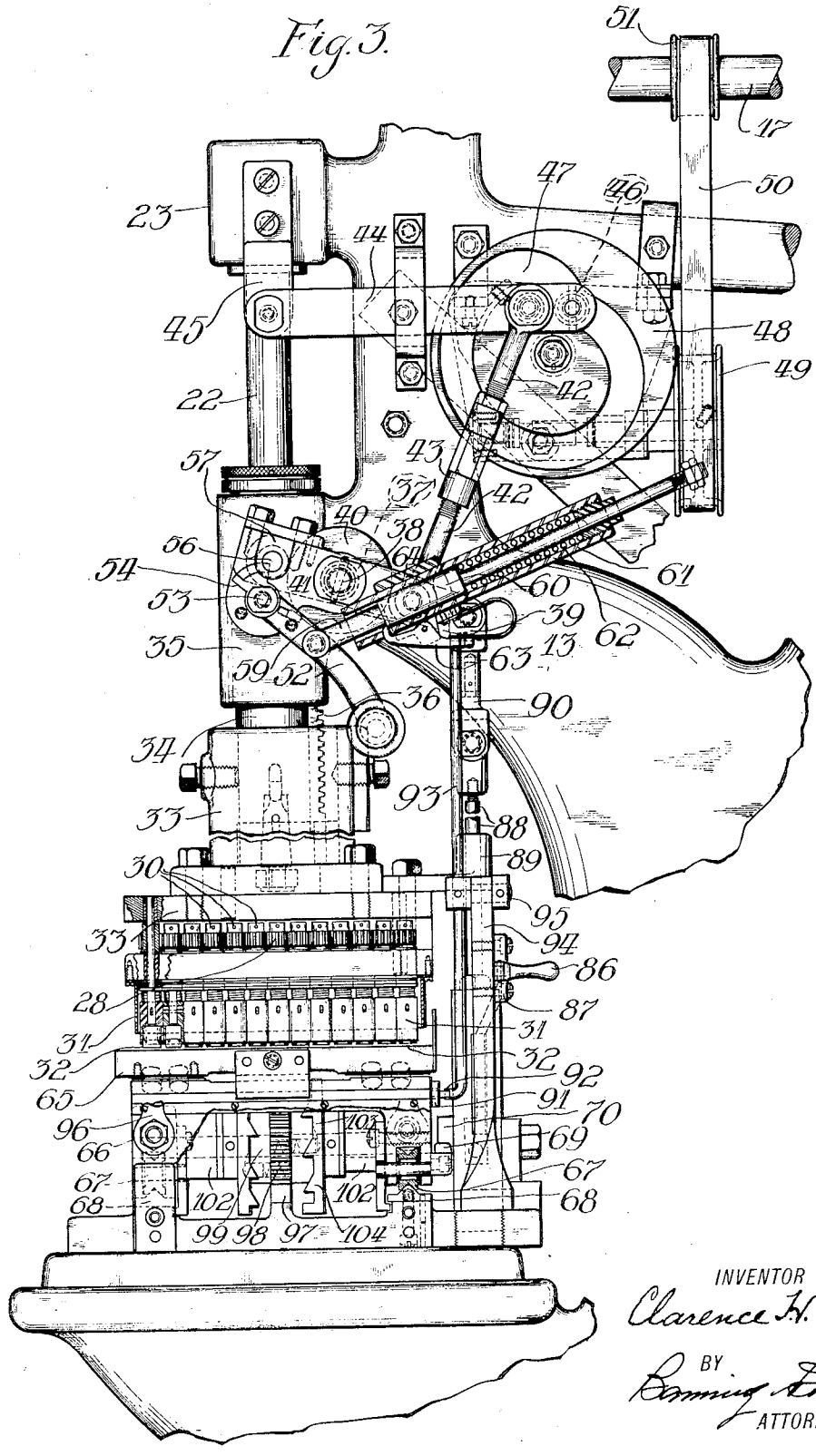
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Fig. 3.



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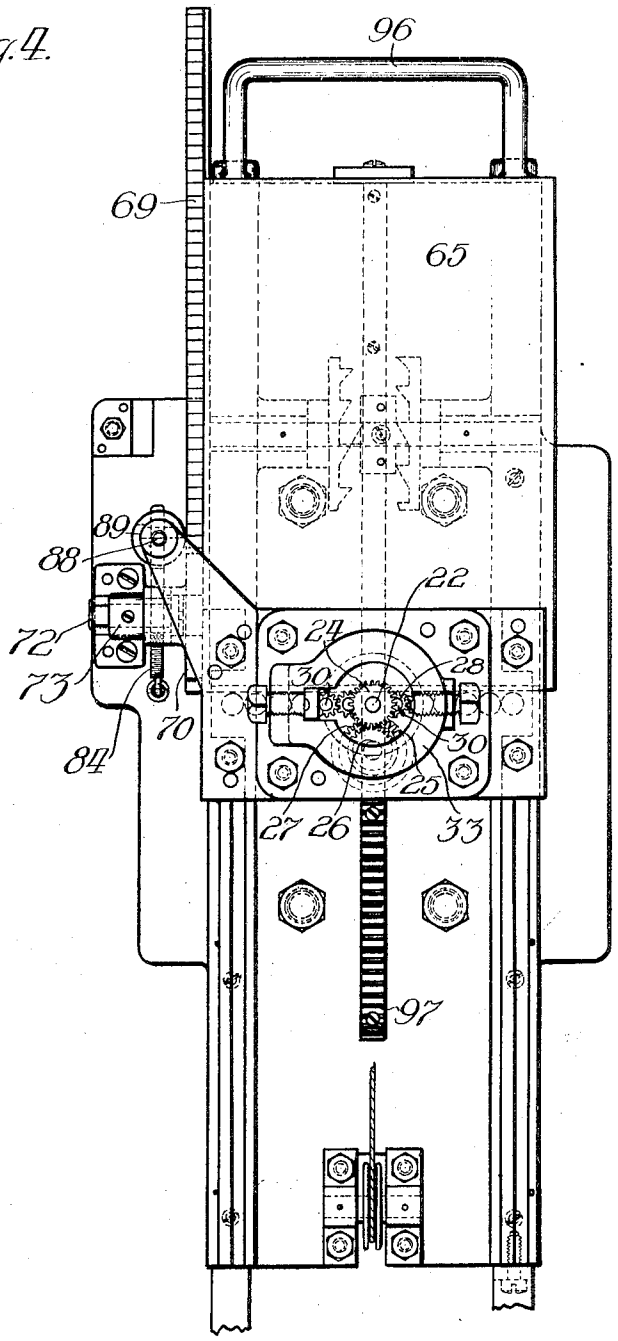
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Fig. 4.



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Fig. 5.

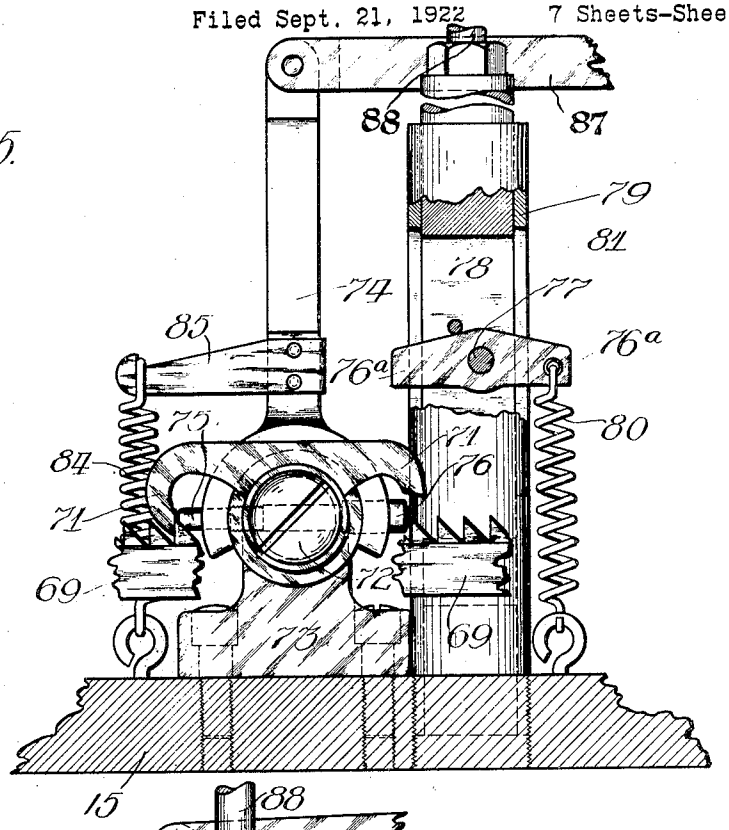
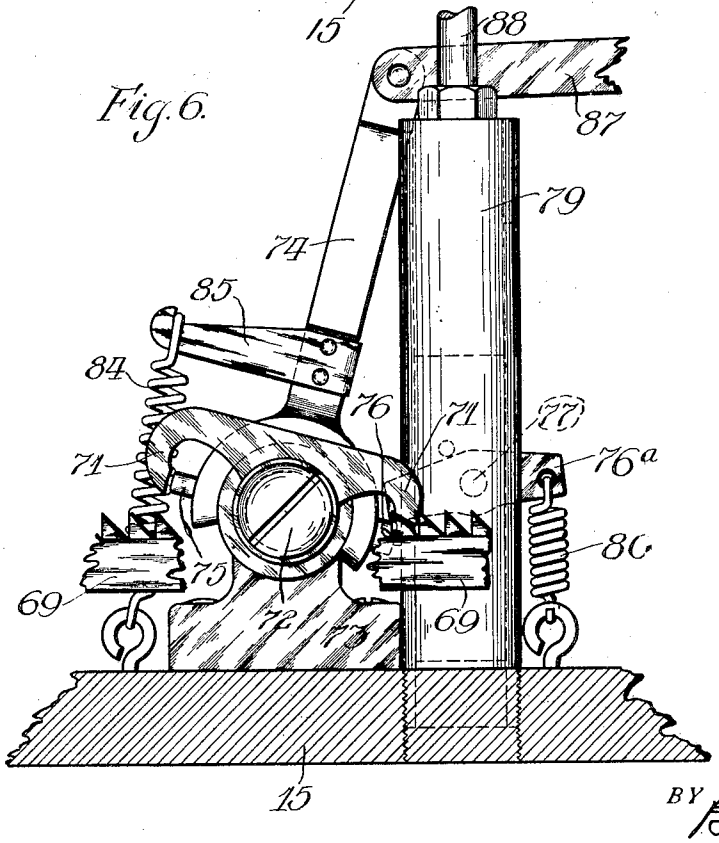


Fig. 6.



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Fig. 7.

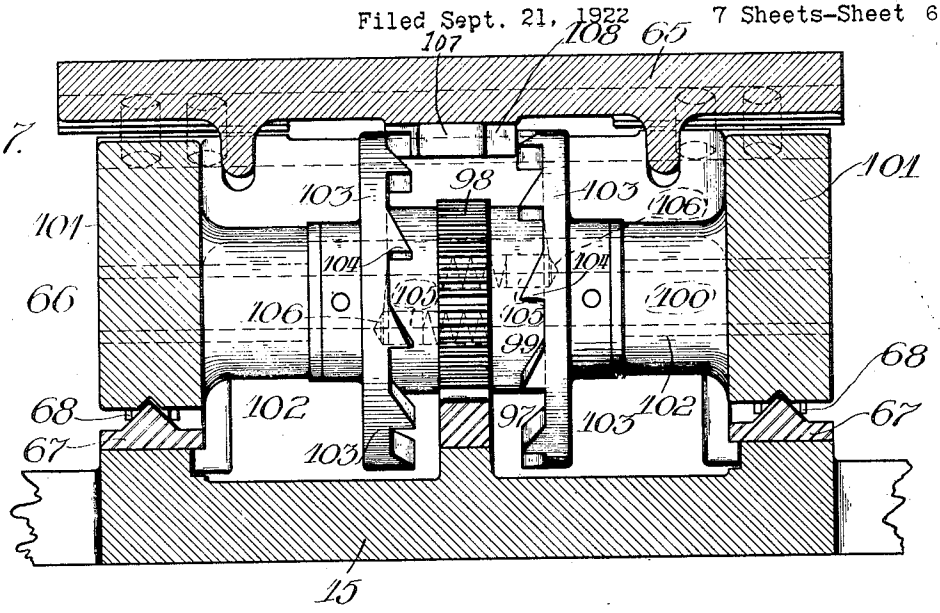
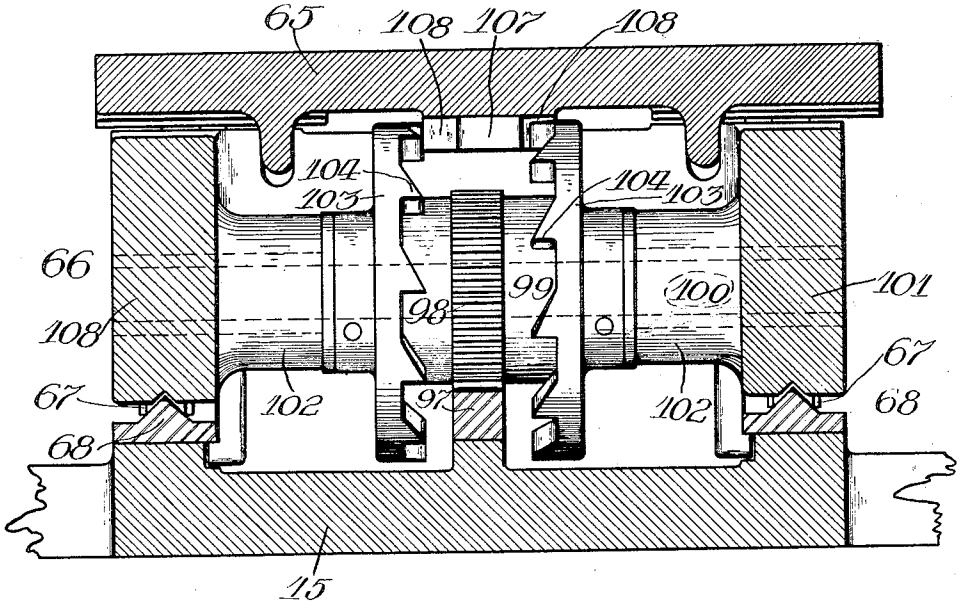


Fig. 8.



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Fig. 9.

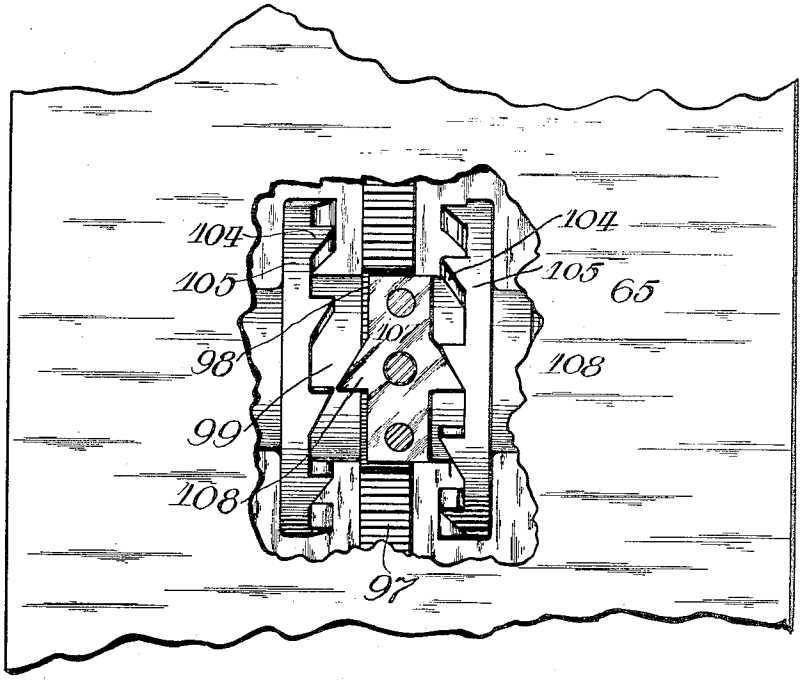
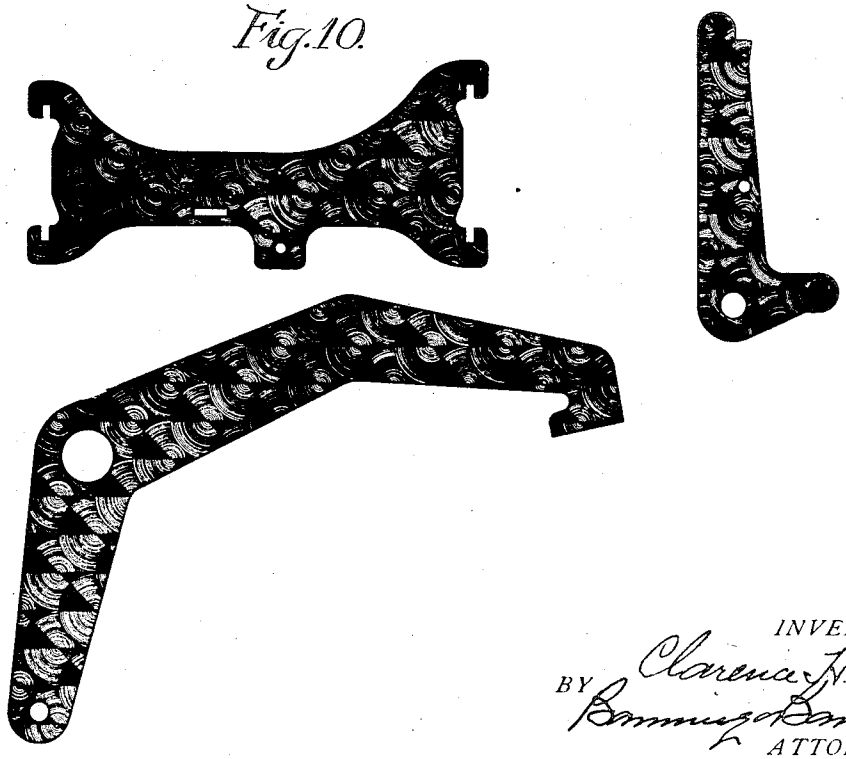


Fig. 10.



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UNITED STATES PATENT OFFICE.

CLARENCE H. WOLFE, OF NORWOOD, OHIO, ASSIGNOR TO THE DALTON ADDING MACHINE COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

BURNISHING MACHINE OR THE LIKE.

Application filed September 21, 1922. Serial No. 589,632.

To all whom it may concern:

Be it known that I, CLARENCE H. WOLFE, a citizen of the United States, residing at Norwood, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Burnishing Machines or the like, of which the following is a specification.

The machine of the present invention is particularly designed to apply to a steel or other metallic surface a type of finish commonly called the damaskeen finish which is a type of finish frequently applied to safety deposit boxes, bank vaults, watch movements and the like. The method of applying this finish consists of first nickle-plating the surfaces of the steel parts, and thereafter buffing or polishing said parts in spots with a small round felt or leather washer rotating in a machine, a fine cutting compound being used in the buffing or polishing process. This method of finishing steel parts has usually involved a very slow and tedious process. It was usually performed by skilled workmen, and the parts to be finished were moved along by hand at regular intervals under the rotating buffer.

The present invention is directed to an automatic machine for performing this work. It is only necessary for the operator to load the machine and to turn a lever which sets the mechanism in motion, after which the work will proceed until completed, at which point the machine will be automatically stopped in preparation for a second load of metal parts.

The machine of the present invention, as disclosed in the drawings, resembles, in its general construction, a standard drill press so that in the following specification it will not be deemed necessary to enter into a detailed description of those parts which are standard in drill presses, the principal description being directed to the special features of the present invention.

In the drawings:

Figure 1 is a side elevation of the complete machine;

Fig. 2 is a front elevation of the upper portion thereof with certain portions of the structure broken away to better illustrate the interior details;

Fig. 3 is a side elevation of the upper portion of the machine with the spindle head and driving gear mechanism broken away;

Fig. 4 is a plan view of the transversely movable work table which carries the work across the machine from side to side as viewed in Fig. 1, and also showing the buffer gearing and associated parts;

Figs. 5 and 6 are two enlarged details of the table escapement mechanism for giving a step by step movement to the table across the front of the machine;

Figs. 7 and 8 are two details of the mechanism for imparting to the table short back and forth movements at right angles to its direction step by step travel;

Fig. 9 is a view looking downwardly upon the mechanism shown in Figs. 7 and 8, the table being broken away to expose the mechanism; and

Fig. 10 illustrates samples of the damaskeen work performed by the machine.

The machine as a whole is mounted upon a foundation plate 11 which carries a standard 12 forking at its upper end into a front arm 13 and a rear arm 14 of a character commonly found in drill presses. The standard 12 is provided at a convenient height with a forwardly extending base bracket 15 which serves as a support for the table and its associated mechanism. The upper arms 13 and 14 are provided with suitable journal heads 15^a and 16 for the journaling of a drive shaft 17 carrying an upper set of stepped pulleys 18 which cooperate with a similar lower set 19 through the medium of a belt 20, power being derived from a belt 21 in a manner common to drill presses of standard construction.

The shaft 17, through suitable beveled gears (not shown) drives a vertical spindle 22 journaled through a head 23 on the forward frame arm 13. The spindle at its lower end (see Figs. 2 and 4) is provided with a main spur pinion 24 which meshes with an upper transmission pinion 25 carried by a counter shaft 26 upon the lower end of which is mounted a lower transmission pinion 27 meshing with a medial pinion 28 of a series of similar intermeshing pinions mounted upon buffer spindles 30 which are arranged in a straight line extending from front to rear of the machine, as viewed in Fig. 1.

Each of the buffer spindles at its lower

end carries a spring backed buffer head 31 which affords a socket for a buffer disk 32 preferably of felt which acts on the work to which a polishing compound, such as emery and oil, is applied. It will be obvious that the rotation of the vertical spindle 22 will, through the gearing shown, drive all of the buffers in unison, alternate buffers rotating in opposite directions.

The buffer spindles and gear drive therefor are mounted within a vertically movable head 33 carried by a sleeve 34 slidably mounted within a guide block 35 vertically aligned with the journal head 23 and integrally formed on the front end of the frame arm 13. The sleeve 34 has secured on its rear side a rack 36 slidable through the guide block 35 and engaged by a pinion 37 shown in dotted lines in Fig. 3. The rotation of the pinion serves to lift the head 33 with the buffer mechanism carried thereby, the spindle drive mechanism being suitably splined or coupled, in a manner common in drill press construction, to permit such lifting action without interfering with the driving movements of the spindle.

The pinion 37 is carried by a transversely arranged stub shaft 38 which extends inwardly from and is rigidly secured to an inner arm 39 which abuts against the face of a boss 40 laterally extending from the guide block 35. The stub shaft 38 also serves as a pivotal mounting for an outer freely rocking arm 41, the two arms, when in locked operative relationship, lying in parallel relation as indicated in Fig. 3.

The outer arm 41 is rocked by means of a sectioned link 42 having an interposed turn buckle 43, the upper end of the link being pivoted to a rocking bar 44 pivoted at its forward end to a bracket 45 secured to the journal head 23 and provided at its rear with a roller 46 entered within a cam truck 47 in a cam wheel 48, which latter is driven from a pulley 49 carrying a belt 50 running over a pulley 51 on the power shaft 17. Suitable worm and gear connections (not shown) are provided for transmitting motion from the pulley 49 to the cam wheel. In order to lock the constantly rocking outer arm 41 with the inner arm 39 which controls the movements of the rack 36, a handle 52 is provided, which handle is pivoted on a pin 53 outwardly projecting from the outer arm. The handle at its inner end is provided with a wedge-shaped cam plate 54 which co-acts with a slot 55 in a spring-pressed locking pin 56 slidably mounted in a bracket 57 outwardly extending from the outer arm 41. The pin is intended, when in locking relation, to register with an aperture 58 in the face of the inner arm 39, so that when the handle is moved in position to release the pin, the latter will spring into the aperture and lock the two arms together, thereby causing the same to rock in unison to raise and lower the head 33 with the burnishing disks carried thereby under the control of the cam wheel 48.

As shown in Fig. 3, the roller 46 occupies its innermost drill position which serves to lower the link 42, thereby turning the pinion 37 in a clockwise direction with an attendant lifting of the burnishing disks which are shown elevated from the work table. The configuration of the cam track indicates that, throughout the major portion of a cam rotation, the roller 46 will be lifted, thereby imparting a downward movement to the burnishing disks which will thus be held in contact with the work throughout the major portion of the cam revolution.

The handle 52 has pivoted thereto a plunger rod 59 which carries a plunger 60 slidably mounted within a barrel 61 and backed by a spring 62. A spring latch 63 is pivoted to the barrel and its forward or acting end is adapted to engage the plunger when in retracted position, so that when the handle has been thrown back, as indicated in Fig. 3, to release the lock pin 56 and lock the inner and outer arms in operating relation, the latch will act to hold the parts in operative relationship until released in a manner presently to be described.

The barrel 61 is carried by a sleeve 64 pivoted to the outer arm in such a manner as to permit the barrel to rock sufficiently to accommodate the operating movements of the handle. The base bracket 15 serves as a mounting for a work table 65 which is mounted upon a traveling carriage 66 mounted upon rollers 67 which travel upon rails 68 extending transversely of the machine, as viewed from the front of Fig. 1.

Means for transporting the carriage step by step across the front of the machine will now be described. The carriage is provided in its center with an escapement ratchet 69 extending from end to end of the carriage, as indicated in Fig. 2. The escapement ratchet has teeth on its upper edge and co-acts with an escapement rocker 70 having fingers 71. The escapement rocker is carried by a rocking pin 72 journaled in a lug 73 upstanding from the base bracket 15 or other fixed portion of the structure.

The rocking pin 72 has also mounted thereon an arm 74 which is secured thereto by a cross pin 75 provided with a protruding head 76 adapted to be contacted by a trigger 76ª pivoted on a pin 77 carried by the plunger 78 slidably mounted within a sleeve or housing 79 upstanding from the base bracket. The far end of the trigger is engaged by a spring 80 likewise secured to the base bracket, the sleeve or housing being provided with slots 81 on opposite

sides to afford clearance for the ends of the trigger.

The arrangement of the parts described is such that when the plunger is depressed to a position indicated in Fig. 6, the trigger, by engagement with the head of the cross pin, will rock the escapement in the direction indicated, thereby releasing and elevating the left finger of the escapement rocker and releasing a tooth on the ratchet bar, the right finger meanwhile coming into engagement with its proximate tooth after the manner common in escapements, thereby allowing the carriage to advance a distance corresponding to one half tooth, which advance is effected by a weight 82 acting through a cable 83 connected with the left end of the carriage, as viewed in Fig. 2.

Upon rise of the plunger 78, the escapement rocker will be drawn back to the position shown in Fig. 5 through the action of a spring 84 which engages a finer 85 carried by the arm 74, thereby effecting another half tooth escapement. When it is desired to move the carriage independently of the action of the plunger, such movement can be effected manually by means of a handle 86 carried by a slide rod 87 which permits of a rocking of the arm 74 irrespective of the position of the trigger 76^a.

The means for coordinating the vertical movements of the buffer carrying mechanism with a step by step feeding movement of the work table will now be described. The plunger 78 has connected thereto a plunger rod 88 which is guided through a bracket 89 laterally projecting from the head 33, which plunger rod, at its upper end, is pivoted to a link 90 which, in turn, is pivoted at its upper end to the inner operating arm 39, so that the plunger will rise and fall in a manner conformable to the movement of said arm which controls the raising and lowering of the buffing tools. As the rear end of the arm 39 descends under control of the cam wheel to the point where the buffing tools are lifted from the work, the plunger 78 will reach its lowermost position, thereby operating the escapement mechanism and permitting a half tooth advance of the table. On the up stroke of the plunger, as the buffing tools begin to descend, the spring 84 will rock the escapement in the opposite direction and effect another half tooth advance of the table, so that a complete oscillation of the escapement mechanism during the idle interval of the buffer will effect a full tooth advance of the work table in preparation for the lowering of the buffers upon a newly positioned section of the work.

In order to automatically stop the step by step advance of the carriage when it has reached its limit of travel to the left, as indicated in Figs. 2 and 3, the carriage is provided with an outwardly projecting stop bar 91 provided with a stop finger 92 so positioned that it will ultimately engage the lower end of a rocking bar 93 pivoted to a standard 94 by a pivot pin 95. The upper end of the rocking bar 93 occupies a position such that when it is rocked, it will engage the tail of the latch member 63 kicking back the latch, and allowing the plunger 60 to spring forward, thereby swinging the handle 52 and withdrawing the lock pin 56 which disengages the inner rocking arm 39, and thereby stopping the feeding movements of the escapement mechanism after which the table may be drawn back to the starting point by means of a handle 96 outstanding from the right hand end of the carriage.

In order to intermittently move the work table back and forth in short steps across the face of the carriage transversely to its line of travel, the following mechanism is provided. The base bracket carries a fixed rack 97 upon which rides a spur gear 98 forming part of a hub 99 (see Figs. 7, 8, and 9), which hub is rotatably mounted upon a fixed shaft 100 carried by the side wall 101 of the carriage, said shaft being entered through bosses 102 protruding inwardly from said side walls.

Freely mounted upon the fixed shaft adjacent the hub 99 on opposite sides thereof are a pair of ratchet wheels 103 having inwardly projecting teeth 104 whose apices occupy intermediate positions with respect to one another. The ratchet wheels are adapted to be locked to the hub by the action of spring-backed locking pins 105 socketed within the hub and adapted to spring into locking recesses 106 in the respective inner faces of the ratchet wheels, which recesses present an abrupt face on one side and an easy face on the other to permit of disengagement of the ratchet wheels from the locking pins when the hub is rotated in a reverse direction to permit a return movement of the carriage.

The oppositely acting ratchet teeth co-act with a plate 107 secured to the under side of the work table 65, as indicated in Fig. 9, which plate is provided on its opposite sides with a pair of beveled teeth 108 in direct opposition to one another. The beveling of the plate teeth is complementary to that of the ratchet wheels, which latter being in staggered relation will act in alternation against the plate teeth, so that as the carriage advances step by step along its track, the gear 98 will be rotated in a feeding direction, and the ratchet wheels, now being locked therewith, will be likewise rotated, thereby imparting back and forth movements of small degree to the work table concurrently with the advance of the carriage which will give to the work a zigzag move-

ment of advance under the fixedly positioned rotating buffer disks. On the return movement of the carriage, the ratchet wheels will be automatically disengaged and the gear will roll freely along the fixed rack 97 as the carriage is returned to its starting position.

From the above description, it will be noted that after the machine is set in operation by a backward movement of the handle 52, the cam wheel will impart a downward movement to the head which carries the buffers, thereby bringing the buffer disks in contact with the emery coated work which the rotation of the buffer disks will serve to impart the damaskeen finish to the work throughout a major portion of rotation of the cam wheel. During the latter part of said rotation, the cam track will effect a lifting movement of the buffer disks, and thereafter the down movement of the arm 39 and a depression of the plunger 78 will operate the escapement mechanism which will effect two half tooth advances of the carriage and work table during the idle interval of the buffer disks. The advance of the carriage will, in turn, effect a cross-wise shifting of the work table with respect to the carriage, so that upon the next descent of the buffer disks, a section of the work, in diagonal relation to that previously finished, will be presented for action.

The above operations will continue automatically until the limit of travel of the carriage has been reached, at which time the handle 52 will be automatically released and the feeding operations will come to a stop. A sidewise shifting of the carriage, concurrently with the longitudinal advancements thereof, gives the completed finish the characteristic appearance of rows of burnished circles in an overlapping relation and with the centers of adjacent rows in staggered relation which is a characteristic feature of a damaskeen finish, as indicated in the samples thereof illustrated in Fig. 10.

Although the invention has been described with particularity as regards the details of construction, it is obvious that numerous modifications in structure and in mechanical detail might be utilized without departing from the spirit of the invention.

It is to be further understood that although the invention is primarily intended as a burnishing machine, the feeding mechanisms might be used in association with other forms of working tools, so that it is not intended to strictly limit the claims to a burnishing machine, unless the claims contain express limitations to that effect.

I claim:

1. In a machine of the general class described, the combination of a working tool, automatic means for advancing and retracting the working tool to and from working position, a work table, automatic means for imparting a step by step movement to the work table concurrently with the retracting of the working tool, and means for imparting to the work table back and forth movements at an angle to the direction of advance of the work table, substantially as described.

2. In a machine of the general class described, the combination of a working tool, automatic means for advancing and retracting the working tool to and from working position, a work table, automatic means for imparting a step by step movement to the work table concurrently with the retracting of the working tool, and means for imparting to the work table back and forth movement at an angle to the direction of advance of the work table concurrently with the feeding movements thereof, substantially as described.

3. In a machine of the general class described, the combination of a rotatable buffer, automatic means for advancing and retracting the buffer to and from working position, a work table, automatic means for imparting a step by step movement to the work table concurrently with the retracting movements of the buffer, and means for imparting to the work table back and forth movements at an angle to the direction of advance of the work table concurrently with the feeding movements thereof, substantially as described.

4. In a machine of the general class described, the combination of a rotatable buffer, automatic means for advancing and retracting the buffer to and from working position, a work table, automatic means for imparting a step by step movement to the work table concurrently with the retracting movements of the buffer, means for imparting to the work table back and forth movements at an angle to its line of advance concurrently with the feeding movements thereof, and means for automatically stopping the feeding movements of the work table and the advancing movements of the buffer at a predetermined point, substantially as described.

5. In a machine of the general class described, the combination of a rotating buffer, a work table, a traveling carriage upon which the work table is mounted, means for lowering and raising the buffer to and from working positions, means for imparting to the carriage a step by step advance during the idle interval of the buffer, and means for imparting back and forth movements of the work table across the carriage during such idle intervals, substantially as described.

6. In a machine of the general class described, the combination of a rotating buffer, a work table, a traveling carriage upon

which the work table is mounted, means for lowering and raising the buffer to and from working position, means for imparting to the carriage a step by step advance during the idle interval of the buffer, means for imparting back and forth movements of the work table across the carriage during such idle intervals, and means operable at a predetermined point in the travel of the carriage for disengaging the carriage feeding means and the buffer feeding means, substantially as described.

7. In a machine of the general class described, the combination of a rotatable buffer, means for rotating the buffer, means for raising and lowering the buffer, a work table, a rack carried by the work table, escapement devices for allowing a step by step escapement of the work table during the idle intervals of the buffer feeding mechanism, and means operable concurrently with the escapement movements of the table for shifting the table at an angle to its line of advance, substantially as described.

8. In a machine of the general class described, the combination of a rotatable buffer, means for rotating the buffer, means for raising and lowering the buffer, a work table, a rack carried by the work table, escapement devices for allowing a step by step escapement of the work table during the idle intervals of the buffer feeding mechanism, means operable concurrently with the escapement movements of the table for shifting the table at an angle to its line of advance, and automatic means operable at a predetermined point in the table advance to stop the operation of the buffer feeding mechanism, the escapement mechanism and the table shifting mechanism, substantially as described.

9. In a machine of the general class described, the combination of a rotatable buffer, means for rotating the buffer, a work table, means for raising and lowering the buffer with respect to the work table, means for imparting a step by step advance to the work table, a cam for controlling the buffer feeding and table feeding devices in alternation to one another, and means operable by the advance of the table for imparting a back and forth movement thereto at an angle to its line of advance, substantially as described.

10. In a machine of the general class described, the combination of a rotatable buffer, means for rotating the buffer, a work table, means for feeding the buffer toward and from the work table, cam actuated means associated with said feeding means, means for locking the cam actuated and feeding means together to effect cam controlled advance and return movements of the buffer, means associated with said feeding means and acting in alternation with the advancing movements thereof for affording a step by step movement to the table, and means actuated by the feed of the table for imparting back and forth movements thereto at an angle to the line of feed, substantially as described.

11. In a machine of the general class described, the combination of a rotatable buffer, means for rotating the buffer, a work table, means for feeding the buffer toward and from the work table, cam actuated means associated with said feeding means, means for locking the cam actuated and feeding means together to effect cam controlled advance and return movements of the buffer, means associated with said feeding means and acting in alternation with the advancing movements thereof for affording a step by step movement to the table, means actuated by the feed of the table for imparting back and forth movements thereto at an angle to the line of feed, and means operable at a given point in the feeding movements of the table for disengaging the cam actuated means, substantially as described.

12. In a machine of the general class described, the combination of a plurality of rotatable burnishers, means for imparting rotation to said burnishers, means for advancing and retracting said burnishers, a work table, a traveling carriage upon which said work table is mounted for movement at an angle to the line of carriage advance, cam controlled operating devices, means for engaging the burnishing feeding means with said operating devices, means associated with the burnishing feeding means and acting in alternation therewith for imparting a step by step feeding movement to the carriage, and interacting means between the carriage and work table for shifting the latter transversely of the work table concurrently with the feeding movements thereof, substantially as described.

13. In a machine of the general class described, the combination of a working tool, a work table associated with the working tool, a carriage on which said work table is mounted, means for imparting step by step feeding movements to the carriage, oppositely acting ratchet teeth carried by the carriage, means actuated by the advance of the carriage for rotating said ratchet teeth, and a member carried by the work table and adapted to be shifted back and forth by the alternate engagement of said ratchet teeth for imparting back and forth movements of said work table with respect to said carriage, substantially as described.

14. In a machine of the general class described, the combination of a working tool, a work table associated with the working tool, a carriage on which said work table is mounted, means for imparting step by step

movements to the carriage, a pair of oppositely acting ratchet wheels carried by the carriage, means operable by the advance of the carriage for rotating the ratchet wheels, and a member carried by the work table and adapted to be alternately engaged by the teeth of said ratchet wheels for imparting back and forth movements of said work table with respect to said carriage, substantially as described.

15. In a machine of the general class described, the combination of a working tool, a work table associated with the working tool, a carriage on which said work table is mounted, means for imparting step by step feeding movements to the carriage, a pair of ratchet wheels carried by the carriage, a gear wheel associated with said ratchet wheels for rotating the same, a fixedly positioned rack meshing with said gear wheel, and a member carried by said work table adapted to be alternately acted upon by the teeth of said ratchet wheels for imparting back and forth movements to said work table with respect to said carriage concurrently with the advance thereof, substantially as described.

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