No. 774,843. PATENTED NOV. 15, 1904.

F. HOLZ.

FEED GEARING FOR MACHINE TOOLS.

APPLICATION FILED AUG. 22, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

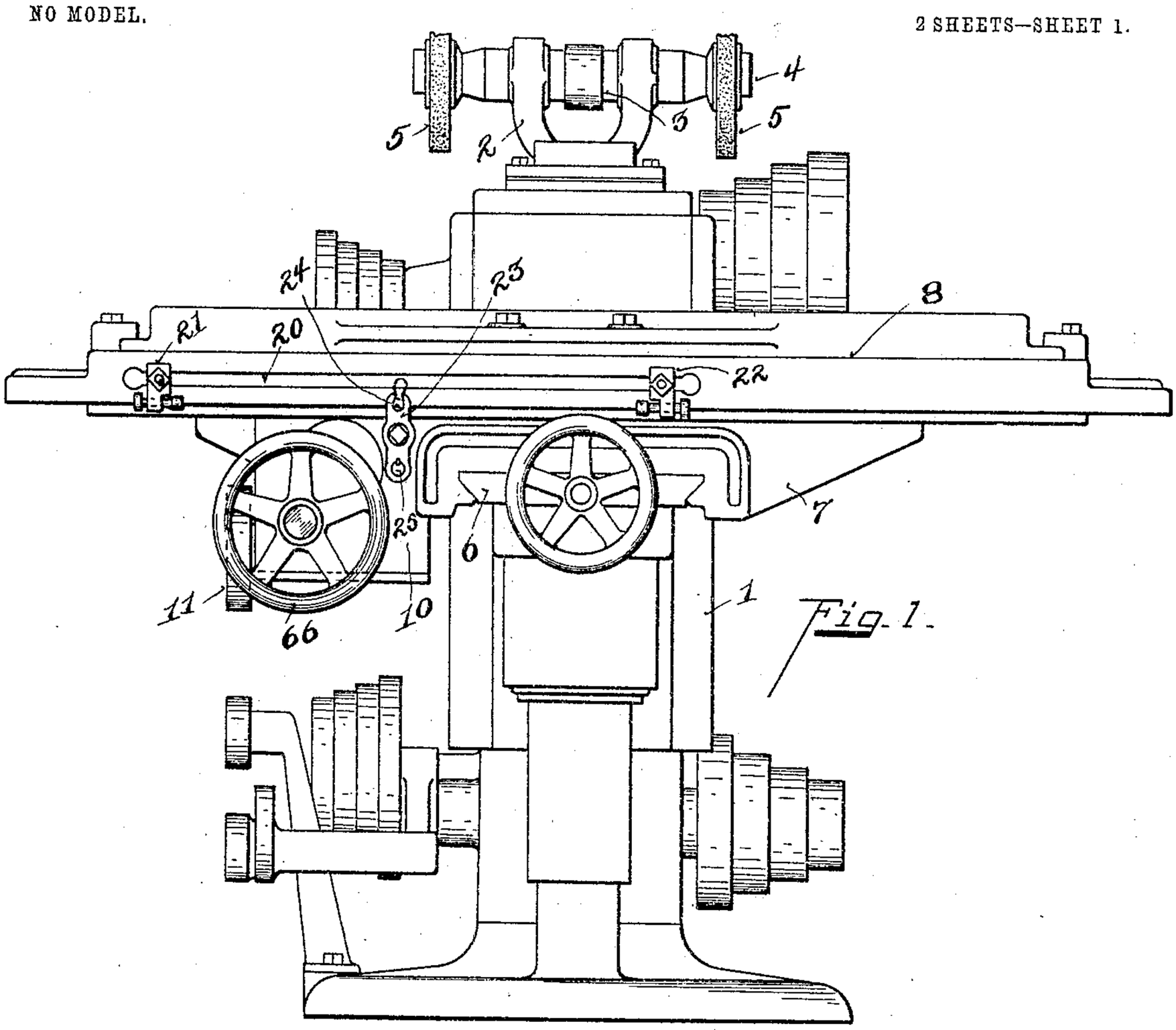

Fig. 1.

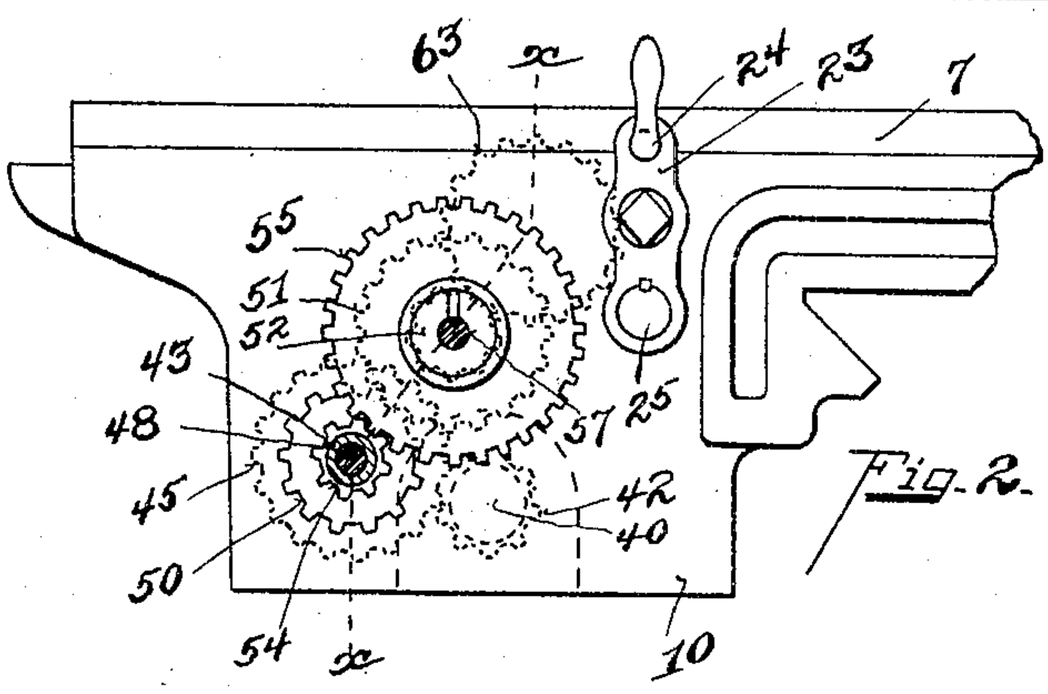

Fig. 2.

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NO MODEL. 2 SHEETS—SHEET 2.

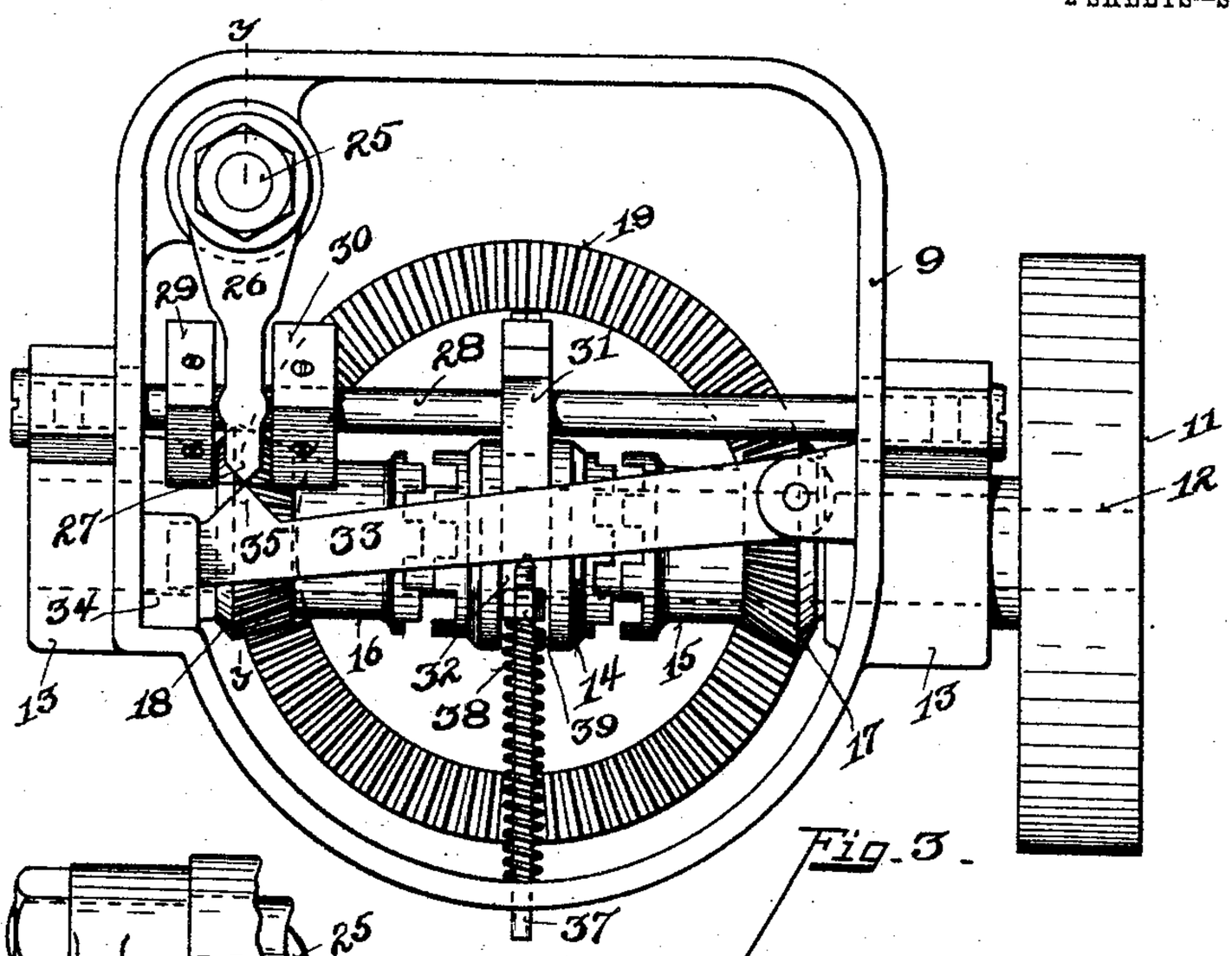

Fig. 3.

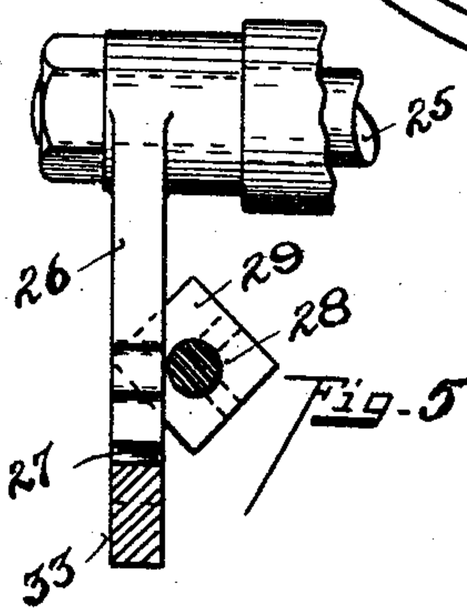

Fig. 5.

Fig. 4.

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No. 774,843. Patented November 15, 1904.

UNITED STATES PATENT OFFICE.

FREDERICK HOLZ, OF CINCINNATI, OHIO, ASSIGNOR TO THE CINCINNATI MILLING MACHINE COMPANY, OF CINCINNATI, OHIO, A CORPORATION.

FEED-GEARING FOR MACHINE-TOOLS.

SPECIFICATION forming part of Letters Patent No. 774,843, dated November 15, 1904.

Application filed August 22, 1904. Serial No. 221,641. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HOLZ, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Feed-Gearing for Machine-Tools, of which the following is a specification.

My invention relates to an improvement shown as applied to grinding-machines; and it consists principally in the feed-gearing and control of the carriage supporting the work.

One of the objects of my invention is to provide tension means for quickly operating a clutch for changing the traverse of the carriage after the clutch-operating mechanism has been tripped.

Another object of my invention relates to the variable-feed gearing interposed between the main drive and carriage for imparting a varied feed to the carriage.

Various other features of my invention are set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of a grinding-machine embodying my improved carriage-feed. Fig. 2 is an enlarged front elevation of the saddle upon which the carriage is supported and traversed, so much of the saddle being shown within which the carriage-feed is supported. Fig. 3 is a front elevation of the power-controlling mechanism for the carriage-feed, illustrating the means for quickly operating the clutch for imparting a forward or reverse movement of the carriage. Fig. 4 is an enlarged section on line $x\,x$, Fig. 2. Fig. 5 is an enlarged section, partly in elevation, on line $y\,y$, Fig. 3.

1 represents the frame of a grinder upon which the various parts of the machine are mounted.

2 represents a U-shaped journal-bracket for supporting the grinding-wheel spindle.

3 represents a pulley fixed to the spindle 4.

5 represents grinding-wheels mounted upon the spindle.

The frame is suitably provided with gibbed ways, upon which is supported the knee-brackets 6, which supports the saddle and carriage. This knee is suitably provided with mechanism for raising and lowering the same, but which are not herein shown, forming no part of this invention.

7 represents a saddle gibbed to the knee 6 and provided with means for suitably adjusting the saddle longitudinally upon the knee.

8 represents a carriage seated upon the saddle having the usual rail and groove engagement therewith for permitting a free traverse of the carriage. At one end of the saddle is provided a gear-box for suitably journaling the gear-wheels imparting the varied feed to the carriage.

9 represents a casing mounted in the rear of the saddle gear-box 10, in which a feed power driving mechanism is journaled, which consists of the following instrumentalities:

11 represents a pulley receiving power from a suitable source and fixed to shaft 12, said shaft being journaled in the bearings 13 of the casing 9.

14 represents a clutch member slidable on shaft 12 and adapted to rotate therewith.

15 and 16 represent right and left hand clutch members adapted to be engaged by the clutch member 14. These clutch members 15 and 16 are provided with bevel-gears 17 18 at their outer ends in mesh with a bevel-gear 19, journaled in the casing 9, which gear 19 is driven by either gears 17 or 18, whichever is clutched to the shaft 12, enabling a forward or reverse rotation to be imparted to the gear 18 or 19.

In this class of grinding-machine it is desirable to automatically shift the clutch 14 to reverse the direction of carriage traverse and which is accomplished as follows: The carriage 8 at its front face is provided with a groove 20. Within this groove are adjustably secured the tripping-dogs 21 22, the distance at which they are set apart from each other controlling the length of the carriage traverse. 23 represents a lever provided with a pin 24 in line with and adapted to be engaged by the dogs 21 22 for actuating the lever 23. 25 represents a shaft fixed to the lever 23 and passing through the gear-box 10 and projecting into the casing 9 and suitably journaled within these members. 26 represents a lever

or rock-arm fixed to the shaft 25 and adapted to be operated thereby, the free end of the lever 26 depending downward and provided with the V-shaped point 27. 28 represents a shifting rod supported within the casing 9 and provided with the nuts 29 30, between which nuts the lever or rock-arm 26 projects. 31 represents a yoke-arm secured to the shaft 28, the yoke of which is seated within the groove 32 of the clutch member 14. Thus it will be seen that when either one of the dogs 21 22, according to the traverse of the carriage, trips the lever 23 it will rock shaft 25 and rock-arm 26, shifting the rod 28 in such direction, which action will throw the clutch member 14 into engagement with either one of the clutch members 15 16, thereby driving the gear-wheel 19 in proper direction.

In order to quickly and positively throw and control the clutch member 14 after it has been tripped, the following tension means is provided: 33 represents a tension-lever, one end of which is pivoted to the casing 9. The opposite end is freely mounted within the guide 34 integral with the casing. This prevents any lateral movement of the tension-lever 33. This tension-lever 33 is provided with the bevel or tapering projection 35, adapted to engage the corresponding projection of the rock-arm 26. 37 represents a tension-rod engaging the tension-lever 33 at one end, its opposite end tapping through an orifice in the casing 9, forming a guide for said rod 37. 38 represents a coil-spring having bearing at one end against the casing and at the opposite end against the adjusting-nuts 39. The tension-lever having an upward tension at all times, the angular projection 35 will always be engaged with the rock-arm 26. Thus, say that the rock-arm 26 be rocked to the right, the incline on the right of the free end of the rock-arm will ride up the incline on the left of the tension-lever until the terminal of each incline is reached, at which point the tension-lever will be relieved of the downward strain of the rock-arm, whence it will have a tendency to fly upward upon the opposite inclines, throwing the shifting rod quickly to the right, thereby making a quick and positive engagement of the clutch member 14 with the clutch member 15, this action being controlled by the tension of the spring 38.

It is very desirable in this class of machine to impart for different classes of work a varied feed of carriage traverse. In order to accomplish this, the gear-box 10 is provided with the following system of change-gearing: 40 represents a shaft to which the bevel-gear 19 is fixed, said shaft extending through the elongated journal-sleeve 41 of the casing 9 and projects into the gear-box 10. Upon the end of said shaft 40 is formed a gear 42.

43 represents a sleeve-shaft journaled in the gear-box 10 and supplemental casing 44. Upon this sleeve-shaft 43 is loosely mounted a gear 45, said gear being provided with a sleeve 46, having clutch-teeth 47. Within the sleeve-shaft 43 is slidably mounted a shifting rod 48, keyed to said sleeve-shaft 43, so as to turn therewith. 49 represents a clutch member fixed to the end of rod 48, the teeth of which are adapted to be engaged with the clutch member 47 of the gear-wheel 45. 50 represents a gear of a different diameter from that of 45, fixed to the sleeve-shaft 43 in mesh with a gear-wheel 51, loosely journaled upon the shaft 52, said gear 51 being provided with the clutch member 53. 54 represents another different-diameter gear-wheel formed on the sleeve-shaft 43 in mesh with a gear 55, loosely journaled on the shaft 52 and provided with the clutch member 56. 57 represents a push-rod fitted into a bore in the shaft 52 and provided with a pin or clutch member 58, said rod 57 being adapted to be pushed forward or backward, thereby throwing the pin 58 into engagement with the clutch member 53 of the gear 51 or with the clutch member 56 of the gear-wheel 55, as the case may be. 59 represents a collar fixed to the shaft 52 for securely holding gear 55 in position on the shaft 52. 60 represents a sleeve fixed in the casing 10, through which the shaft 52 projects and within which it is journaled. 61 represents a collar fixed to the shaft 52, having bearing against the sleeve 60, the shaft being provided with a shoulder abutting the opposite end of the sleeve for securely holding shaft 52 in position. 62 represents gear-teeth formed on the shaft 52 and in mesh with the gear-wheel 63, fixed to the stud-shaft 64, which stud-shaft is suitably mounted in bearings in the gear-box 10. 65 represents a rack secured to the carriage 8, gear-wheel 63 being in mesh with said rack for traversing the same. 66 represents a hand-wheel fixed to the sleeve-shaft 43 for operating said shaft by hand. Thus to impart one speed for the forward or reverse traverse of the carriage the following train of gears is in action: from pulley 11, driving-shaft 12, through the clutch 14, driving bevel-wheel 17 or bevel-wheel 18, whichever is engaged with the clutch, driving gear-wheel 19, shaft 40, gear 42, gear 45 on the sleeve-shaft 43, clutch member 49 being engaged with clutch member 47, thus driving sleeve-shaft 43, gear-wheel 50, gear-wheel 51, with clutch member 58 being in mesh with clutch member 53 of gear 51, thereby driving shaft 52, thence through gear 63, driven by the gear formed on the shaft 52, said gear 63 driving or traversing the table. The second change of speed being made by bringing the clutch member 58 into engagement with the clutch member 56 of gear-wheel 55, disconnecting gear-wheel 51, motion will be imparted to the gear 63 through the gears 54 and 55, gears 50 and 51 being idle as drivers.

In order to traverse the carriage by hand, clutch member 49 is disengaged from the

clutch member 47 by pushing the clutch-rod 48 inward. Thus by revolving the hand-wheel 66 motion is transmitted, through sleeve-shaft 43, gears 50 51, to shaft 52, if the clutch member 56 is engaged with the clutch member of gear 52, through said shaft 52, gears 62 63, to the carriage-rack 65. Changing the clutch member to engage into the clutch member of the gear 55, motion will be imparted to the carriage from gear-wheel 54 through gear 55, shaft 52, gear 62, gear 63 to the carriage-rack 65. By this construction two changes of speed are adapted to be received and imparted to the carriage when either the power or hand drive is employed, and which arrangement is very compact and easily and quickly manipulated.

By the term "corresponding tapering projections" is meant any formation on the meeting surfaces of the tension-bar and rock-arm adapted to insure a full and quick movement of the rock-arm.

In order to understand the phraseology employed in the claims, it should be explained that the term "shifting device" is intended to cover generically the mechanism which as it is shifted to the right or left by the actuating-arm 26 alternately reverses the speed, and in the form shown said mechanism specifically comprises the clutch 14, the sliding shaft 28, the connecting-arm 31, and the blocks 29 and 30, which form the connection between the shifting device and the actuating rock-arm 26. This specific arrangement is not of the essence of the invention and can be substituted by other well-known forms of speed-changing devices.

Having described my invention, I claim—

1. In a machine of the class described, a frame, a reciprocating carriage thereon, a feed mechanism therefor, comprising right and left hand and intermediate bevel gear-wheels, a shifting device adapted to alternately reverse the direction of feed, a rock-shaft, connections between the rock-shaft and carriage adapted to alternately rotate said shaft in opposite directions, a rock-arm on said shaft, connections between the rock-arm and shifting device adapted to reciprocate the latter, a tension-lever fulcrumed on the frame, a tension device engaging the free end of the bar and pressing it yieldingly against the end of the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces, adapted to complete the throw of the rock-arm in opposite directions, as it is actuated by the tripping connections between the rock-shaft and carriage, substantially as described.

2. In a machine of the class described, a frame, a reciprocating carriage, a feed mechanism therefor comprising right and left hand and intermediate bevel gear-wheels, a shifting device adapted to alternately reverse the direction of feed, a rock-shaft, tripping connections between the rock-shaft and carriage adapted to alternately rotate said shaft in opposite directions, a rock-arm depending from the rock-shaft, connections between the rock-arm and the shifting device adapted to reciprocate the latter, a horizontally-disposed tension-bar fulcrumed on the frame, a spring engaging the free end of the bar and pressing it yieldingly against the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces adapted to impart a predetermined throw to the rock-arm in opposite directions as it is actuated by the tripping connections between the rock-shaft and carriage, substantially as described.

3. In a machine of the class described, a frame, a reciprocating carriage, a feed mechanism therefor comprising right and left hand and intermediate bevel gear-wheels, a shifting device adapted to alternately reverse the direction of feed, a rock-shaft, tripping connections between the rock-shaft and carriage adapted to alternately rotate said shaft in opposite directions, a rock-arm on the rock-shaft, connections between the rock-arm and shifting device adapted to reciprocate the latter, a tension-bar disposed substantially at right angles to the rock-arm, said bar being pivoted at one end, an adjustable spring-controlled plunger under the free end of the tension-bar adapted to press said bar yieldingly upward directly against the end of the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces adapted to impart a predetermined throw to the rock-arm in opposite directions as it is reciprocated by the tripping connections between the rock-shaft and carriage, substantially as described.

4. In a machine of the class described, a frame, a reciprocating carriage, a feed mechanism for the carriage comprising reversing gear-wheels on the rear of the frame, a shifting device for alternately bringing into operation the reversing gear-wheels, a rock-shaft, transversely journaled through the frame, tripping connections between the front end of the rock-shaft and the carriage adapted to alternately rotate said shaft in opposite directions, a rock-arm on the rear end of the rock-shaft, connections between the rock-arm and shifting device adapted to reciprocate the latter, a tension-bar pivoted on the rear of the frame transversely relative to the rock-arm, an adjustable spring-controlled plunger engaging directly the free end of the tension-bar and pressing the same yieldingly directly against the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces adapted to impart a predetermined throw to the rock-arm in opposite directions as it is reciprocated by the tripping connections between the rock-shaft and carriage, substantially as described.

5. In a machine of the class described, a frame, a reciprocating carriage thereon, a feed mechanism therefor, comprising a right and left hand and intermediate bevel gear-wheels, clutch members on said right and left hand gears, a shifting device comprising a shifting clutch member adapted to alternately engage the coöperating clutch members on said gear-wheel to alternately reverse the direction of feed, transmission-gearing between said bevel gear-wheel and carriage, said transmission-gearing being adapted to be thrown into and out of commission by said clutch mechanism for imparting a varied traverse feed to the carriage, a rock-shaft, connections between the rock-shaft and carriage adapted to alternately rotate said shaft in opposite directions, a rock-arm on said shaft, connections between the rock-arm and shifting device adapted to reciprocate the latter, a tension-lever fulcrumed on the frame, a tension device engaging the free end of the bar and pressing it yieldingly against the end of the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces, adapted to complete the throw of the arm in opposite directions as it is actuated by the tripping connections between the rock-shaft and carriage, substantially as described.

6. In a machine of the class described, a frame, a reciprocating carriage thereon, a feed mechanism therefor, comprising right and left hand and intermediate bevel gear-wheels, a shifting device adapted to alternately reverse the direction of feed, transmission-gearing between said bevel gear-wheel and carriage, comprising a sleeve-shaft provided with two gears of different-diameter fixed thereto, a third gear of different diameter loose upon said sleeve-shaft and provided with a clutch member, a rod slidably fixed within said sleeve-shaft having a clutch member adapted to be engaged with the clutch member of the last-named gear, a second shaft provided with three different-diameter gear-wheels, two of which are loosely mounted thereon and in mesh with the fixed gears on the sleeve-shaft, a clutch push-pin fitted within said last-named shaft adapted to fix either one of said loose gears to said shaft whereby two changes of feed may be imparted to the carriage, a hand-wheel fixed to the sleeve-shaft adapted to feed the carriage by hand, a rock-arm actuated by the carriage for shifting the shifting device, a tension-lever fulcrumed on the frame held yieldingly against the end of the rock-arm, said rock-arm and tension-bar having corresponding tapering projections on their meeting surfaces, adapted to complete the throw in a shifting operation, substantially as described.

In testimony whereof I have hereunto set my hand.

FREDERICK HOLZ.

Witnesses:
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LEO O'DONNELL.