Dec. 9, 1924. 1,518,707

F. H. SLEEPER

PLANER OR SHAPER

Filed Nov. 17, 1919 3 Sheets-Sheet 1

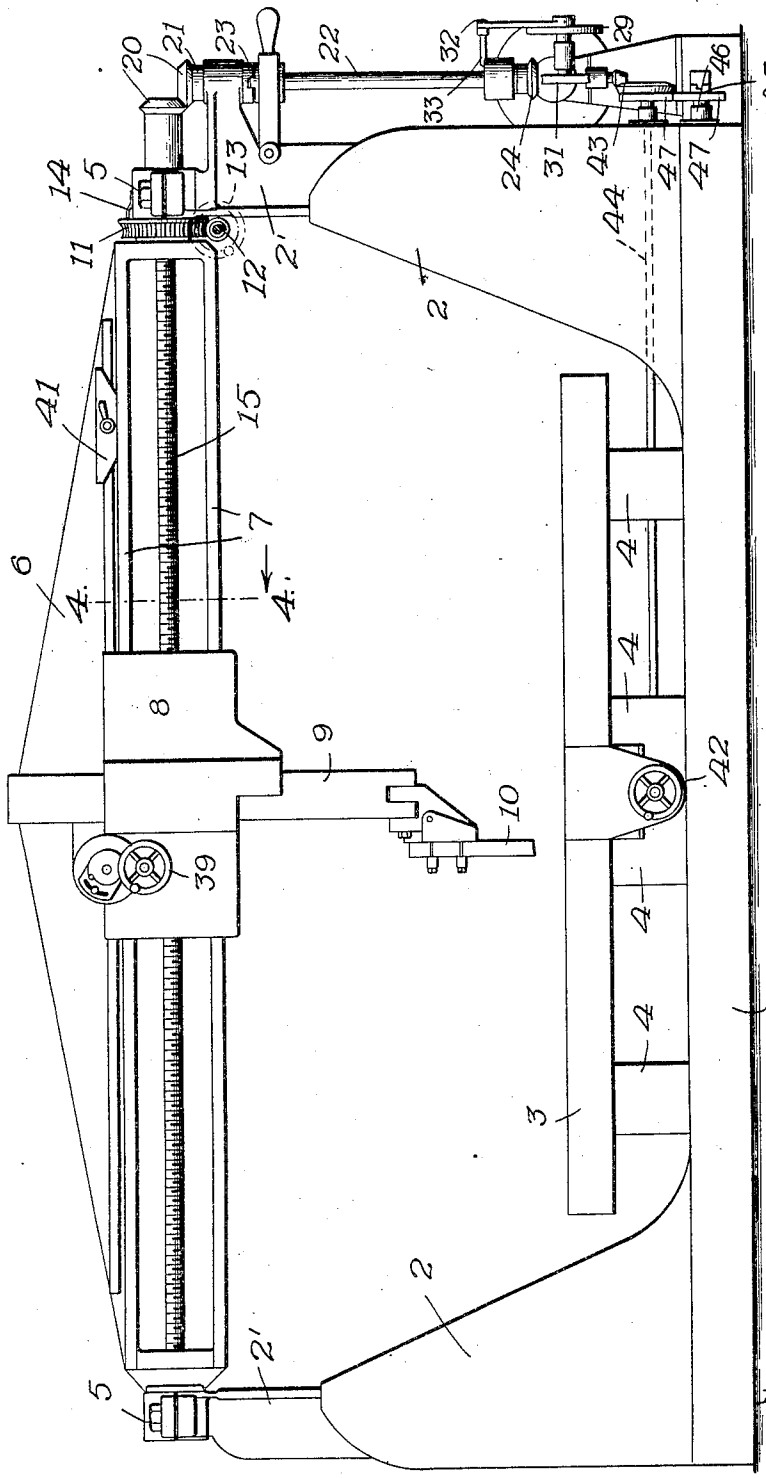



Fig. 1.

Inventor
F. H. Sleeper
By Attorney
Geo. B. Kennedy

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F. H. SLEEPER

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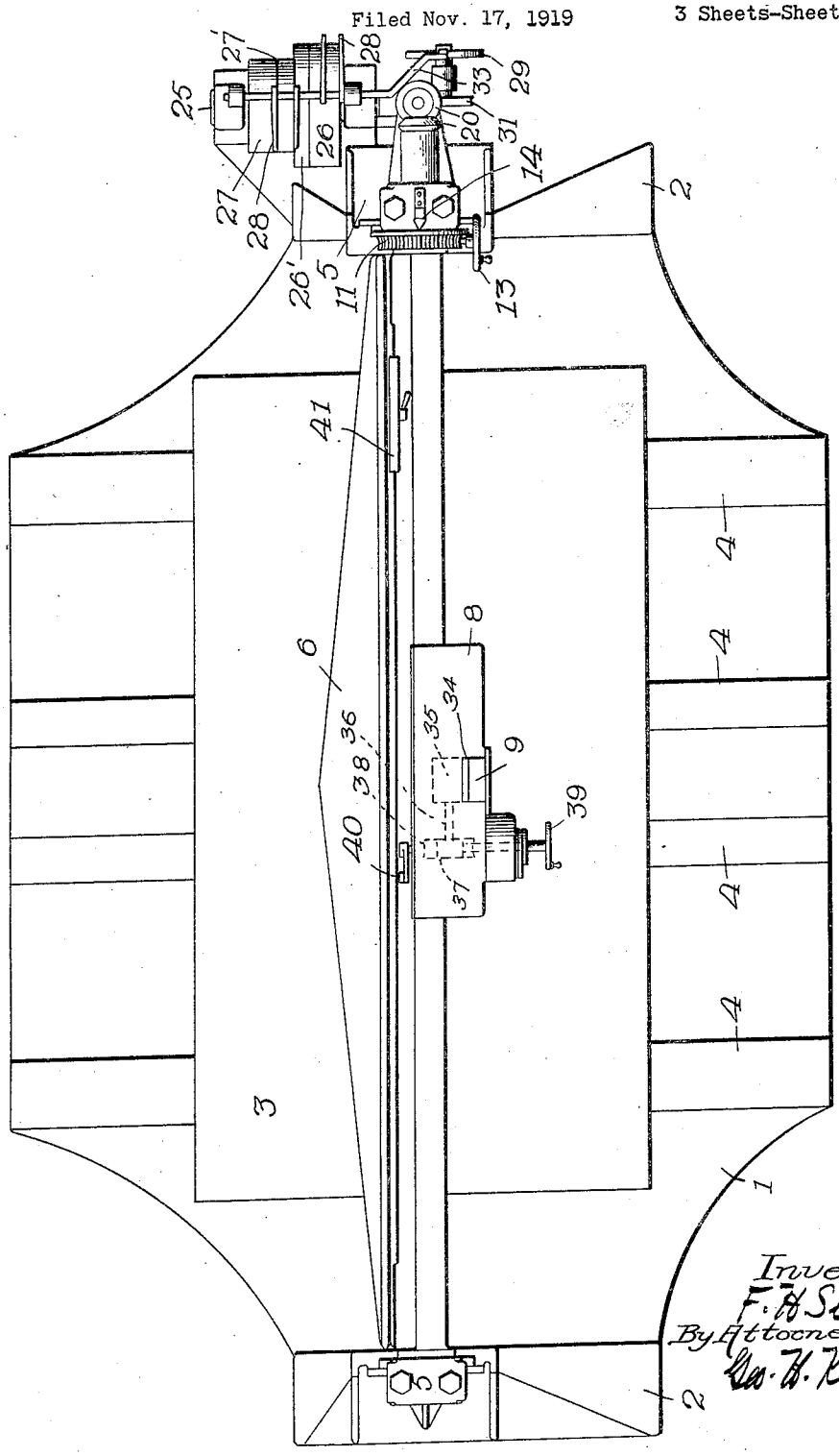



Fig. 2.

Inventor
F. H. Sleeper
By Attorney
Geo. H. Kennedy

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F. H. SLEEPER

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Fig. 3.

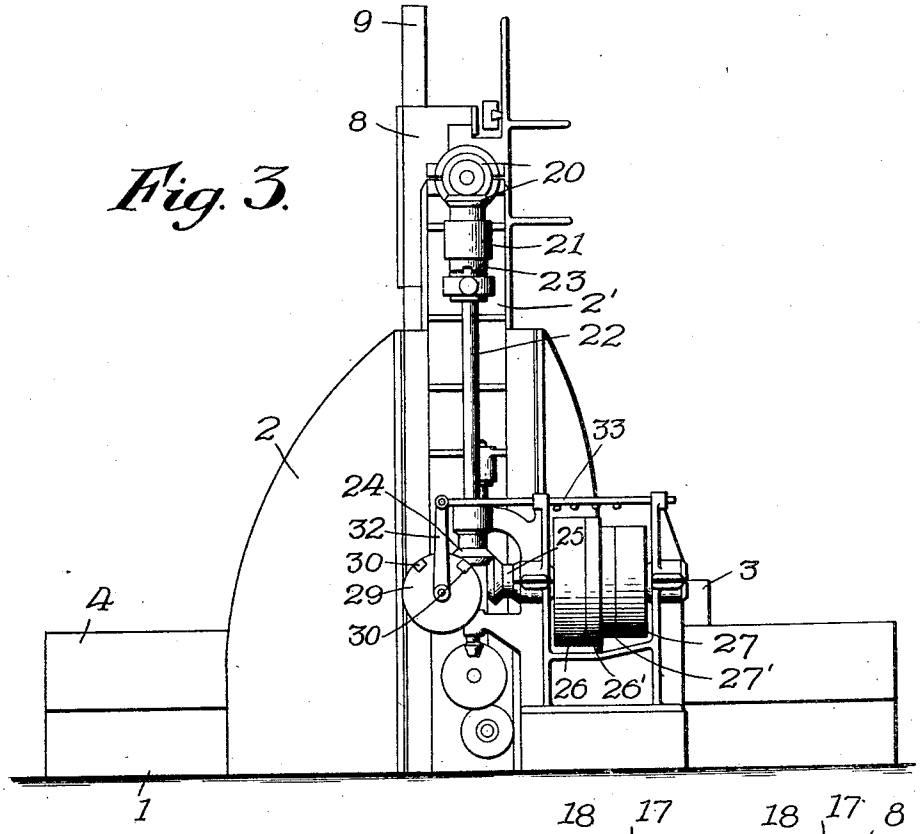
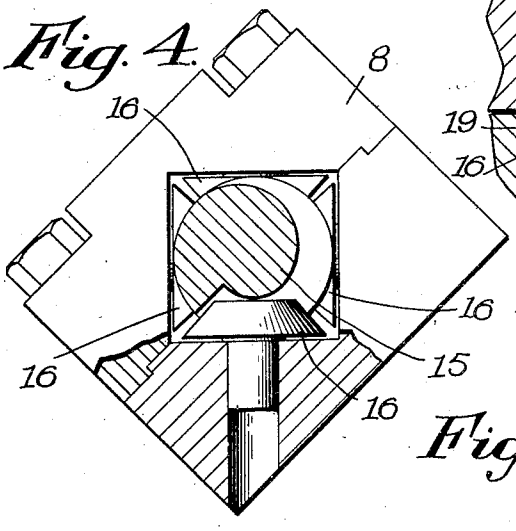



Fig. 4.



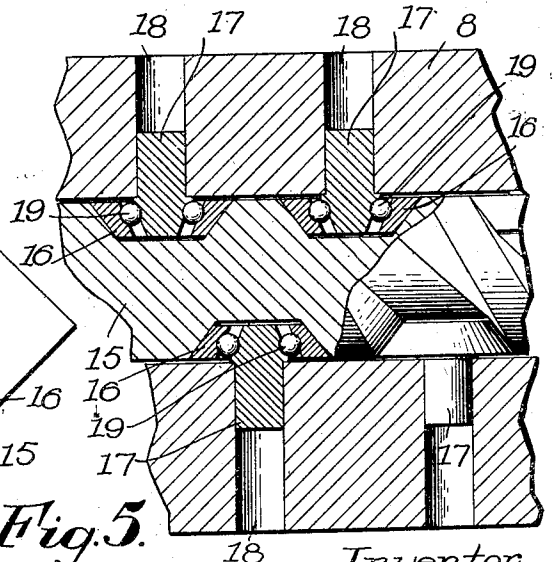




Fig. 5.

Inventor
F. H. Sleeper
By Attorney
Geo. H. Kennedy & Co.

Patented Dec. 9, 1924. 1,518,707

# UNITED STATES PATENT OFFICE.

FRANK H. SLEEPER, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO SLEEPER & HARTLEY, INC., OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## PLANER OR SHAPER.

Application filed November 17, 1919. Serial No. 338,679.

*To all whom it may concern:*

Be it known that I, FRANK H. SLEEPER, a citizen of the Dominion of Canada, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, United States of America, have invented a new and useful Improvement in a Planer or Shaper, of which the following, together with the accompanying drawings, is a specification.

The present invention relates to a machine for planing and shaping metal. The invention contemplates improvements in machinery of this class which involves a relative reciprocatory movement between the work and the tool. The primary object of the invention is to provide a machine adapted for work of the nature ordinarily accomplished by a planer, but which, unlike the planers now in use, operates by imparting reciprocatory movement to the tool rather than to the work. In other words, the invention contemplates a machine, which partakes generally of the nature of a shaper in respect of tool movement, but which has a range and capacity equal to that of a planer, where the work instead of the tool is reciprocated.

The details of such a machine, as I now contemplate for the attainment of the above objects, are fully set forth in the following description, reference being had to the accompanying drawings, in which—

Figure 1 is a view of the machine in side elevation.

Figure 2 is a top plan view of the machine.

Figure 3 is a view in end elevation.

Figures 4 and 5 are detail views illustrating the construction of the tool moving devices, Fig. 4 being a section on the line 4—4, Fig. 1.

Like reference characters refer to like parts in the different figures.

The base or frame of the machine is designated by the numeral 1, as consisting of an extended flat portion, providing at each end the uprights 2, 2. To space between these uprights is sufficient to accommodate the work supporting table 3 of the machine, the latter being preferably disposed upon suitable transverse supporting flanges 4, 4, of the base 1, and being movable transversely of said base in a manner hereinafter described.

The uprights 2, 2, serve for the support, above the work table 3, of the tool carrying and moving devices of the machine. To this end adjustable standards 2′, 2′, of said uprights provide alined trunnion openings or bearings 5, 5, in which are fitted the ends of an elongated beam structure 6, the latter providing longitudinal ways or guides 7, 7, for a reciprocatory tool carrying block 8. The block 8 supports a bar 9, to the lower end of which is secured the tool 10 for operation on the work that rests on table 3. In the normal position of the beam 6, the bar 9 and tool 10 stand perpendicular; the beam 6, however, is adapted to be turned on its trunnions, as will be well understood, to carry the bar 9 and tool 10 out of the perpendicular or into an inclined plane so as to adapt the machine for different classes of work, as where an undercut groove is to be formed.

This axial adjustment of the beam 6 may be effected in any desired manner; as here shown for purposes of illustration the beam 6 is equipped near one end with a worm wheel 11, with which meshes a worm 12 that carries a hand crank 13. If desired, the face of the worm wheel 11 adjacent the bearing 5 may provide a graduated dial, so that the degree of angular adjustment of the beam 6 may always be accurately measured and determined on said dial, with reference to a fixed indicator 14 on the stationary bearing. In this way the tool 10 can be made to cut at any desired angle, as will be well understood.

For imparting reciprocatory movement to the block 8 and tool 10 carried thereby, there is journalled in the beam 6 a longitudinal shaft 15 which passes completely through the block 8. As shown in Figs. 4 and 5 the shaft 15 has an exterior thread of large pitch, and preferably the groove of said thread is of a width and cross section to receive frusto-conical hardened rollers 16, 16, that project inwardly from the block 8 into the bore or opening thereof through which the shaft 15 passes.

As shown clearly in Fig. 5, the several rollers 16 which fit the thread groove in the shaft 15 are preferably individually mounted on bearing studs 17, 17 let in through suitable openings 18, 18, of the block. The rollers 16 are here shown as provided with suitable antifriction devices, such as ball bear-

ings 19, to enable them to turn freely on the studs 17, whereby to prevent any tendency of said rollers to bind or slip in the thread groove of shaft 15. As shown in Fig. 4, the distribution of the studs 17 in the block 8 is preferably such that a roller 16 is provided at 90° intervals for each complete convolution of the spiral thread groove, thus ensuring an adequate bearing for the block 8, whereby any tendency of the latter to vibrate or chatter is prevented.

Since the block 8 is prevented from turning by its engagement with the guides 7, 7, of beam 6, it is obvious that rotation of shaft 15 will cause longitudinal travel of said block along the beam 6, on account of the above described screw connection between said block and said shaft. The shaft 15 is held against longitudinal movement by any suitable thrust devices, not shown, associated with the bearings of said shaft in the beam 6. For rotation of said shaft 15, one end of same is provided with a bevel gear connection 20 with a vertically journalled sleeve 21. A shaft 22 in axial alinement with sleeve 21 is adapted to be rotatably connected with said sleeve by any suitable clutching device, such as shown at 23, Fig. 1, and said shaft 22, constituting the driving means for the shaft 15, is itself continuously rotated by a bevel gear connection 24 with a main driving shaft 25.

The main driving shaft 25 carries adjacent fast and loose belt pulleys 26, 26′, and 27, 27′, adapted to be respectively connected to the line shafting, or other source of power, not shown, by straight and crossed belts, as is usual in machinery of this class. Through the medium of belt shifting devices 28, 28, of the usual type, the driving belts, not shown, for the pulleys 26 and 27 are adapted to be moved simultaneously on and off of the idle and effective portions of said pulleys, in the usual manner, whereby the shaft 25 is adapted to have the direction of rotation reversed, as will be well understood. In this way, the threaded shaft 15, that causes movement of the block 8 is adapted to be rotated first in one direction and then in the other, thereby causing the block 8 to travel back and forth with respect to the underlying work on the table 3. The automatic shifting of the belt pulleys, to effect this reversal of the block 8 at each end of the stroke of the tool is accomplished in any well known manner as by the employment of a disk or plate 29 carrying adjustable stops 30, 30, said plate being slowly rotated by a worm and worm gear connection 31 with the shaft 22. The stops 30, 30, which may be set to give any desired stroke or travel of the tool are carried into engagement with a lever arm 32, to the free end of which is secured a rod 33 that carries the belt shifters 28, 28.

As above described, the machine of the present invention is enabled to operate on substantially the same class of work for which a planer of the usual work reciprocating type is required. In the present machine, the necessity of reciprocating a massive piece of work which is undergoing planing is entirely avoided, the only reciprocating part in the present machine being the relatively light tool carriage or block 8. The ordinary planer, involving the reciprocatory movement of heavy work, can never be speeded up, without introducing tremendous vibration throughout the machine, but with the present machine, the tool carriage or block 8 can be moved back and forth at a relatively high speed, without any of the difficulties above enumerated. It is obvious that the invention, the principal and essential features of which are described above, is susceptible of various changes in construction, without departing from the spirit of the same, as defined in the annexed claims. It is also obvious that various refinements in details relating to adjustment and automatic movement or feeding of the several component mechanisms may be availed of by those skilled in the art to which the invention relates.

For instance, the bar 9 which carries the tool 10 may readily be made automatically movable for the purpose of carrying the tool into a new position with respect to the work at the end of each operative stroke. To this end, said bar 9, as shown in Fig. 2, is formed on one side with rack teeth 34 for engagement by a pinion 35 on a shaft 36 that provides a worm gear 37 in mesh with a worm 38. A manual adjustment may be obtained by connecting the shaft of worm 38, through suitable gearing, not shown, with a hand wheel 39 on the front of block 8, or, through the medium of a bell crank 40, cooperating with an adjustable stop 41 on the beam 6, the automatic movement of the bar 9 can be obtained at the end of each return stroke of the tool carriage. Also, for the transverse movement of the work table 3, a hand wheel 42 may be used in connection with a worm, not shown, to get any desired adjustment, or, if desired, the power of shaft 25 may be employed for this purpose, by using a bevel gear connection 43 and clutching means, not shown, of any well known type, to drive a worm operating shaft 44. In order to obtain vertical adjustment of the standards 2′, 2′, the latter are engaged by suitable worms or screws, not shown, of the usual construction, which may be put in operation, at the will of the operator, by a suitable clutch 45, that is adapted to procure rotation of a worm driving shaft 46, by means of gears 47, 47, in the manner common to devices of this class.

I claim,

1. In a machine of the class described, the combination with work supporting means, and an overlying reciprocating tool carriage, of rotating means having its axis parallel with the line of movement of said tool carriage, for procuring said reciprocation and means for angularly adjusting said tool carriage about the axis of said rotating means.

2. In a machine of the class described, the combination with work supporting means, and an overlying reciprocating tool carriage, of a guideway for said tool carriage overlying said work supporting means, and rigidly supported beyond both ends of the movement of said carriage and means for angularly adjusting said guideway.

3. In a machine of the class described, the combination with work supporting means, and an overlying reciprocating tool carriage, of a supporting structure for said tool carriage overhanging said work supporting table at each end thereof and means for angularly adjusting said supporting structure.

4. In a machine of the class described, the combination with work supporting means, and an overlying reciprocating tool carriage, of a guideway for said tool carriage overlying said work supporting means and rigidly supported beyond both ends of the movement of said carriage, and means for angularly adjusting said guideway about an axis parallel to the line of movement of said tool carriage.

5. In a machine of the class described, a tool carrier, a screw for reciprocating same, and a plurality of rollers journalled in said tool carrier and engaging the thread of said screw.

6. In a machine of the class described, a work supporting table, a rigid support extending lengthwise of said table, above the same, means for angularly adjusting said support, a tool carrier slidable in said support above said table, and a shaft, running lengthwise of said support, for reciprocating said tool carrier.

FRANK H. SLEEPER.

Witnesses:
PENELOPE COMBERBACH,
NELLIE WHALEN.