

G. KUWADA.
METAL PLANER.

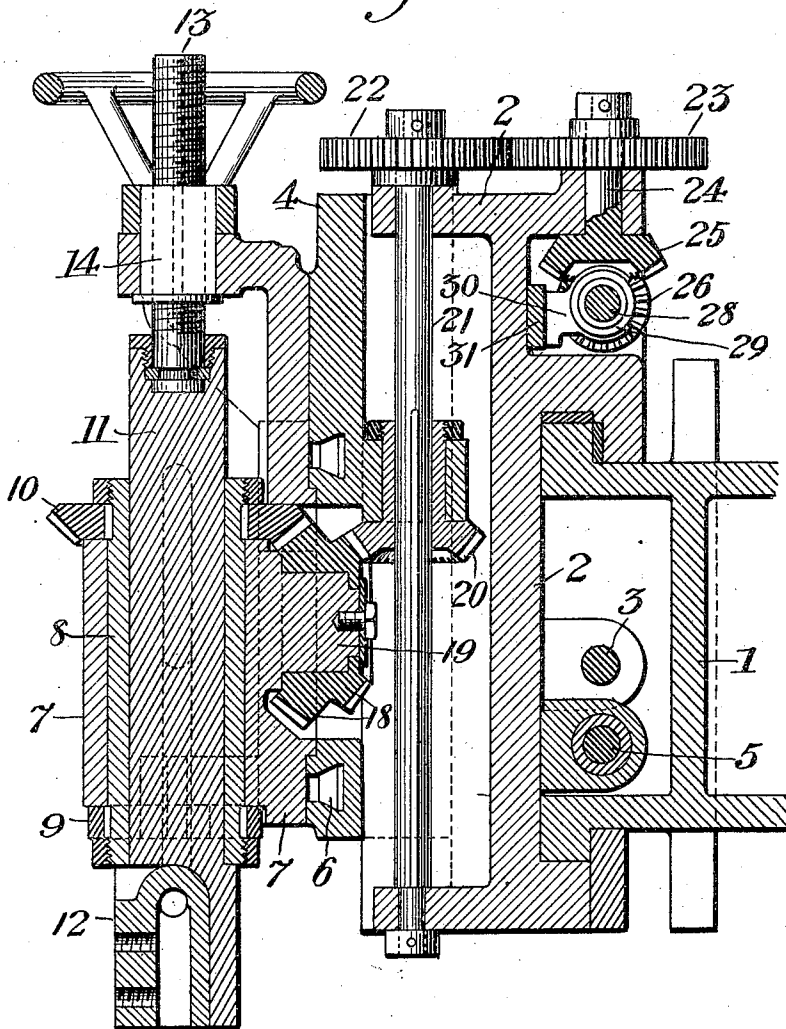
APPLICATION FILED JULY 9, 1908.

934,078.

Patented Sept. 14, 1909.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
G. Nedemeier
H. W. Cronbeck.

Inventor:
Gompei Kuwada
by Howard A. Coombs
his attorney

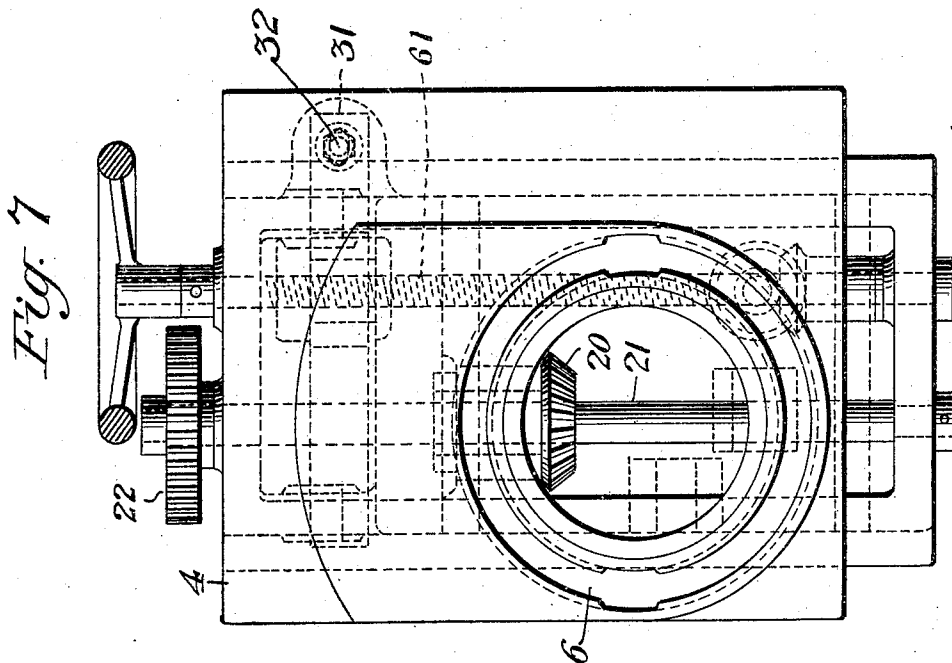
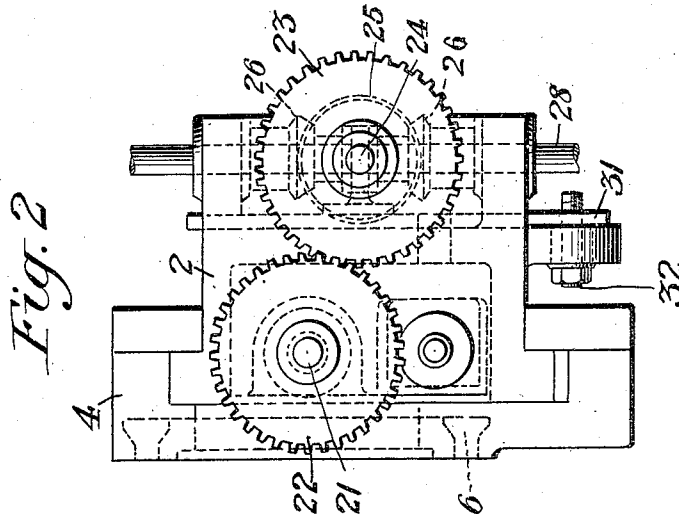
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4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.

Fig. 3.

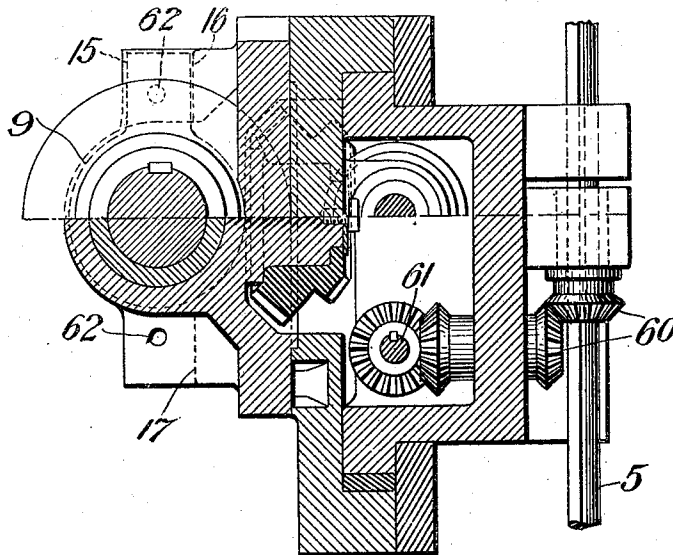
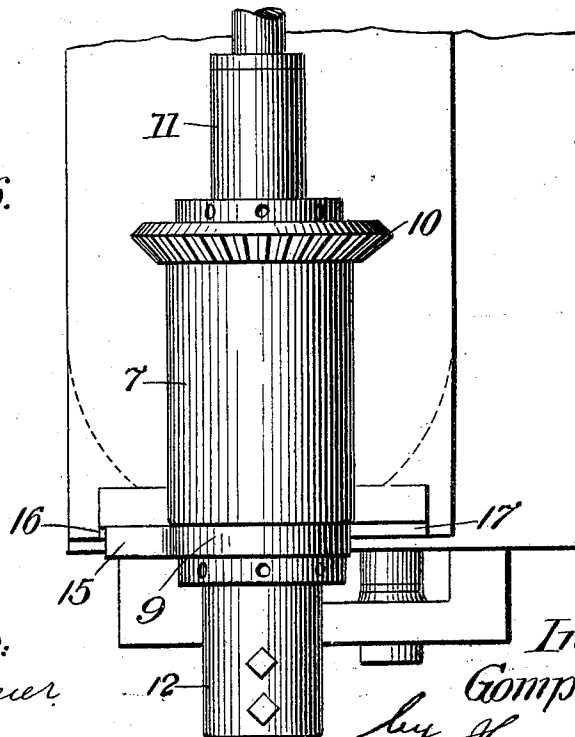


Fig. 6.



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4 SHEETS—SHEET 4.

Fig. 4.

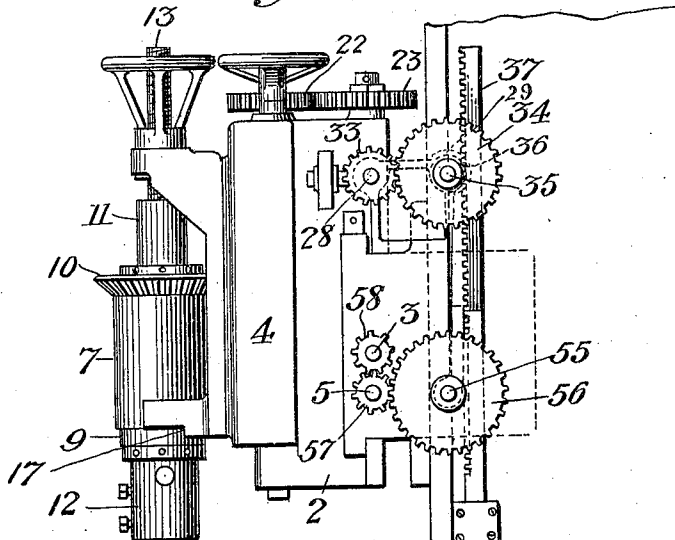
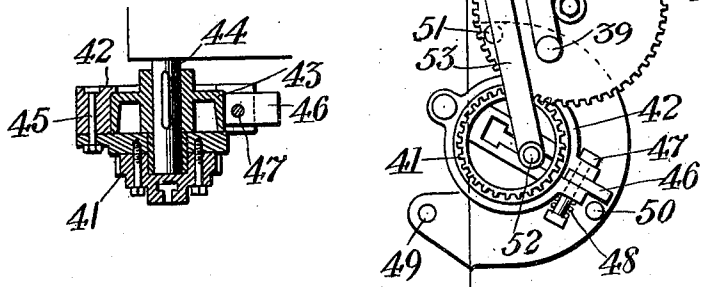


Fig. 5



Witnesses.

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UNITED STATES PATENT OFFICE.

GOMPEI KUWADA, OF KOBE, JAPAN.

METAL-PLANNER.

934,078.

Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed July 9, 1908. Serial No. 442,777.

To all whom it may concern:

Be it known that I, GOMPEI KUWADA, a subject of the Japanese Emperor, residing at Kobe, Japan, have invented certain new and useful Improvements in Metal-Planers, of which the following is a specification.

My invention relates to metal-planing machines, and consists more particularly in an improved mechanism for reversing the tool at the end of each stroke of the table, so that the tool cuts on both strokes. When desired, however, the planer may be used in the ordinary way, by disconnecting the reversing mechanism.

I am aware that it is old to provide means for so reversing the tool at each stroke, my invention consisting, as stated above, in the particular mechanism employed, which comprises positively actuated means for rotating the tool-holder through 180° at the end of each stroke, said means being operatively connected to the cross-feed mechanism, so that said parts are positively correlated in their action, that is, neither can operate without the other, when it is desired to have the tool cut on both strokes. Furthermore, the rotating means is so arranged that it operates just the same whether the tool is being fed vertically or horizontally, and at whatever angle the tool-holder is held.

My invention is illustrated in the accompanying drawing, in which,

Figure 1 is a vertical cross-section of the cross-rail and tool supports of a planer equipped with my invention; Fig. 2 is a plan view of the saddle and carriage; Fig. 3 is a plan-sectional view of Fig. 1, taken on two different planes; Fig. 4 is a side elevation of so much of a planer as is necessary to illustrate my improvements; Fig. 5 is a sectional detail of the friction feed mechanism; Fig. 6 is a partial front view of the tool-holder, and Fig. 7 is a front view of Fig. 1 with the tool-holder removed.

In these views, 1 represents the cross-rail and 2 the saddle mounted thereon for horizontal movement, the screw by which said saddle is fed being represented at 3. Mounted in ways on said saddle for vertical movement is the carriage 4, said movement being imparted, either automatically or by hand, from the shaft 5, which is connected, in the usual way, by bevel gears 60 with a vertical feed-screw 61, engaging a nut, not shown, on the carriage 4. A circular way 6 is formed in the face of said carriage 4, and in said

way is mounted for circular adjustment a tool-holder 7, rotatably mounted within which is a sleeve 8, having a ring 9 secured to it below its bearing in the tool-holder and a bevel-gear 10 secured to it above said bearing. A tool-shank 11 is slidably mounted within the sleeve 8, being keyed thereto so as to rotate therewith and carrying the tool-clapper-box 12 at its lower end. The shank 11 is vertically adjusted in the sleeve 8 by means of a screw 13, swiveled to said shank and engaging in a nut 14 held in the tool-holder 7. The ring 9 has a lug 15 projecting from it, which comes alternately into contact with abutments 16 and 17 formed on the holder 7, as shown in Figs. 3 and 4.

Bevel-gear 10, on the sleeve 8, is in mesh with a bevel-gear 18, carried upon a journal 19 projecting from the tool-holder 7 concentrically with the axis around which said tool-holder is angularly adjustable, said gear 18 having formed thereon a second set of teeth which mesh with those of another bevel-gear 20, which is splined to a vertical shaft 21, and carried in a bearing formed on the carriage 4. The shaft 21 is journaled in bearings on the saddle 2 and carries a spur-gear 22 on its end, which meshes with a similar gear 23 carried by a short shaft 24, likewise journaled in the saddle and carrying a bevel gear 25 on its other end. Two oppositely-facing bevel-gears 26, one of which is shown in Fig. 1, carried by a horizontal shaft 28, are in mesh with gear 25, which is thereby turned in one direction or the other according as to which of the gears 26 is clutched to shaft 28 by the clutch-sleeve 29, which is slidably keyed to said shaft, and is moved by a fork 30, projecting from a bar 31, which is slidably mounted on the saddle 2 and can be clamped in adjusted position by a bolt 32. The purpose of the two gears 26 and clutch is to enable the tool to be properly reversed at the beginning of the cutting stroke in either direction. Shaft 28 carries also a spur-gear 33, see Fig. 4, which meshes with a like gear 34 on a parallel shaft 35, on which is also a pinion 36, with which engages the vertically-guided rack 37. The lower end of this rack is connected by a link 38 with a crank-pin 39 carried by a gear 40, which is in mesh with a gear 41, the pitch diameter of which is one-half that of the gear 40. The gear 41 is carried by one of the driving-shafts 44 of the planer and is connected frictionally

thereto by the strap 42, which surrounds a friction sheave 43 keyed to said shaft. The arrangement of these parts is shown in Fig. 5. The gear 41 is bolted at 45 to the strap 42, between the ends of which is held a tongue 46. A bolt 47 passes through the ends of the strap and the tongue and a spring 48 on said bolt tends to hold the strap closed on the tongue. Stop-pins 49 and 50 are mounted in the frame of the machine in the path of said tongue and at the proper distance apart so that the gear 41 will be turned, at each reversal of the table, an amount just sufficient to rotate the tool-shank through 160°.

Provision is made, as shown at 51, Fig. 4, for placing an intermediate stop-pin in the path of the tongue 46, said pin being used when the planer is used to cut on one stroke only, as will be hereinafter further explained.

The horizontal feed of the saddle, or the vertical feed of the carriage, is derived from the gear 41, the face of which is slotted for the reception of a crank-pin 52, adjustably secured in said slot and connected by a link 53 with another vertically-guided rack 54, in mesh with a pinion on the shaft 55, which carries a spur-gear 56, in mesh with a pinion 57 on the shaft 5. This shaft is the one which transmits the vertical feed movement to the carriage 4, and its pinion 57 meshes with a pinion 58 on the feed-screw 3, which imparts the horizontal feed-movement to the saddle 2. Both said pinions are loose on their respective shafts and can be clutched thereto, but, as this mechanism is the usual one employed on planers of this type and forms no part of my invention, I have deemed it unnecessary to illustrate it in full.

The operation when the tool is to be reversed is as follows: The shaft 44 rotates alternately in opposite directions in accordance with the reciprocations of the planer-table. The gear 41 is rotated with said shaft until the tongue 46 strikes one of the stop-pins 49 or 50. Gear 41 is likewise rotated, but owing to its pitch diameter being twice that of gear 41, it is turned through an arc only one-half as great. Thus while the rack 54 makes a complete reciprocation upward and downward, the rack 37 moves only in one direction. Consequently at the end of each stroke of the table, the tool is fed a uniform amount, either vertically or horizontally as desired, while the tool is reversed or turned through 180°. This is an impor-

tant feature of my invention as it is essential that the tool perform a like amount of work on each stroke. The rotating movement being transmitted through the axis of circular adjustment of the tool-holder, the latter can be adjusted to any angle without affecting the operation of the reversing mechanism. Thus the tool can be held at any angle while planing vertical surfaces on the work. When it is not desired to reverse the tool, the clutch 29 is thrown out, thereby disconnecting the reversing mechanism, a pin being dropped through the holes 62, formed in the ring 9 and in the tool-holder, to lock the tool-shank to the tool-holder, and the intermediate stop-pin is placed at 51, so that the tool is fed only one-half as much as before.

The counter-shaft, through which the planer is driven may be a two-speed counter-shaft, so that when the planer is used as a double-cut planer, the table may be moved at the same speed on both strokes, but when it is used as an ordinary planer, the return stroke may be made at a higher speed.

It will thus be seen that I have provided an improved mechanism for reversing the tool at the end of each stroke, the same being exact in its action and positively connected with the tool-feed mechanism, and operative at whatever angle the tool may be held.

Having thus described my invention what I claim is:

In a planer, the combination with the driving mechanism, the saddle, the carriage and the angularly adjustable tool holder, of a tool-shank rotatably mounted in said holder, a feed screw to feed said saddle horizontally, a feed screw to feed said carriage vertically, connections including a slip device, between said driving mechanism and said feed-screws, a bevel gear connected to said tool-shank, a double bevel gear in mesh therewith and mounted concentric with the axis of angular adjustment of said holder, a vertical shaft journaled in said saddle, a bevel gear thereon, and also in mesh with said double bevel gear, gearing for rotating said shaft, said gearing being connected to the said slip-device and stops to limit the rotation of the tool-shank in the holder.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GOMPEI KUWADA. [L. S.]

Witnesses:

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