(No Model.)

W. W. HULSE.

METAL PLANING MACHINE.

No. 302,632. Patented July 29, 1884.

Fig. 1.

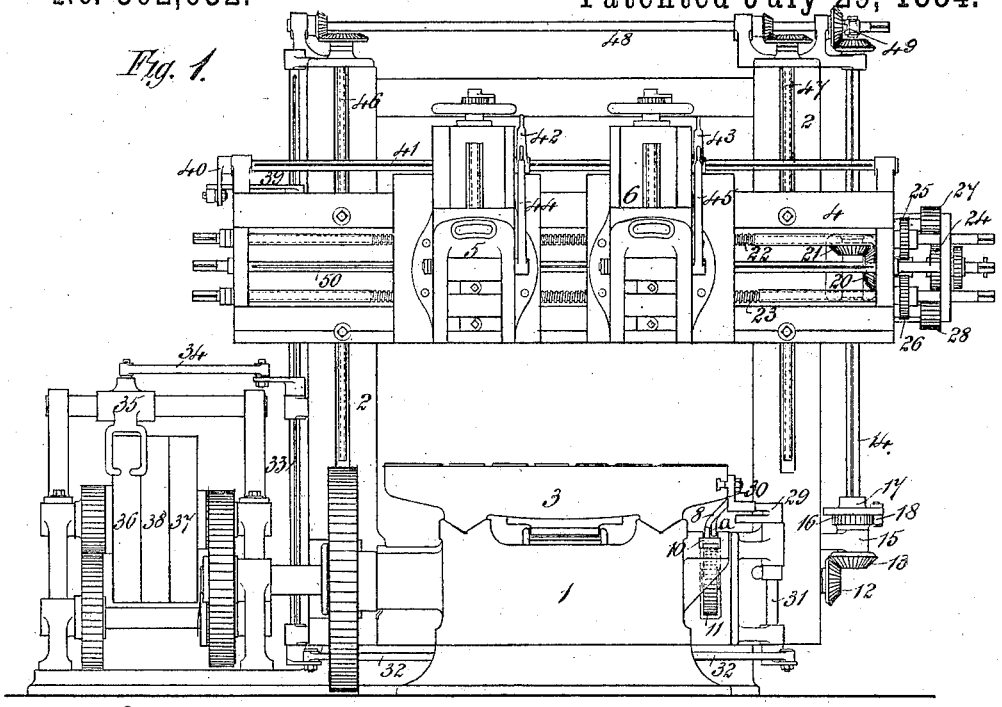

Fig. 3

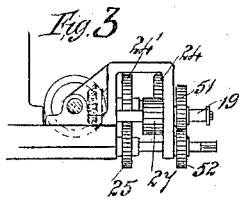

Fig. 2

Witnesses:
J. H. Blackwood
R. L. Dewey

Inventor:
William W. Hulse
By W. W. Doolittle
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM W. HULSE, OF DIDSBURY, NEAR MANCHESTER, COUNTY OF LANCASTER, ENGLAND.

METAL-PLANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 302,632, dated July 29, 1884.

Application filed January 19, 1884. (No model.) Patented in England December 24, 1881, No. 5,664.

To all whom it may concern:

Be it known that I, WILLIAM WILSON HULSE, a subject of the Queen of Great Britain and Ireland, residing at Didsbury, near Manchester, in the county of Lancanster, in the Kingdom of Great Britain and Ireland, have invented new and useful Improvements in Machines for Planing Metals, (for which I have obtained a patent in Great Britain, No. 5,664, bearing date December 24, 1881,) of which the following is a specification.

My invention relates to improvements in machines for planing metals; and the chief objects of the improvements are to increase the extent and range of the width of "cut" which may be imparted to the cutting-tool, and to diminish the wear and tear of the mechanism which applies the cut. These objects are attained by the mechanism illustrated in the accompanying sheet of drawings, and described in the following specification.

On the sheet of drawings, Figure 1 is a front elevation, and Fig. 2 is a side elevation, of a planing-machine embodying my improvements; and Fig. 3 is a plan of part of the feed-motion.

In these drawings, 1 is the bed of the machine; 2 2, the uprights; 3, the sliding table; 4, the cross-slide; and 5 6 two tool-slides.

7 8 are two stops, (7 having two horns, *a b*,) secured to and adjustable along one edge of the sliding table 3.

9 9′ are two projections (one at one side and the other at the other side) upon a rack, 10, which is movable to and fro endwise in guides upon the bed, as shown. The movement of the rack in one direction is produced by the horn *a* of the stop 7 acting upon the projection 9 on the rack, and the movement in the other direction is produced by the stop 8 acting upon the projection 9′ on the rack. The extent of the movement of the rack is governed by the positions of the stops 8 and 7.

11 is a spur-wheel gearing into the rack 10, by the reciprocations of which the spur-wheel is turned alternately backward and forward. The spur-wheel 11 is keyed upon a shaft, on which is also keyed the bevel-wheel 12, which gears into a bevel-wheel, 13. The bevel-wheel 13 is free to rotate in one direction upon the lower end of a grooved upright shaft, 14. It has a long boss which passes through the bearing 15 and carries the ratchet-wheel 16.

17 is a disk keyed upon the shaft 14, and carrying a pawl, 18, which gears into the ratchet-wheel 16. By the intervention of this ratchet-and-pawl arrangement, and of the accessory parts, already described, the to-and-fro movements of the sliding table 3 cause the shaft 14 to rotate during the whole or a part (according to the positions of the stops 8 and 7) of each backward movement of the sliding table, and in one direction only. The rotation of the shaft 14 is thus intermittent, and similar rotation is communicated by it to the horizontal shaft 19, Fig. 2, through bevel-wheels 20 and 21, the latter being free to slide endwise along the shaft 14, as occasion requires. It will thus be seen that the reciprocating bed, through the stops 7 and 8, causes the rack 10 to travel first in one direction and then in the other. This rack, meshing with the spur-wheel 11, causes said spur-wheel to rotate first in one direction and then in the other, and the gear-wheel 12, being located upon the same shaft as the spur-wheel 11, is rotated in a similar manner. The gear-wheel 13, which meshes with the wheel 12, is thus given rotary motion alternately in opposite directions, and through the means of the ratchet-wheel 16, located upon its shaft, the pawl 18, and the disk 17, which is keyed to the shaft 14, said shaft is caused to rotate intermittently in one direction only.

22 23 are the two screws for operating the two tool-slides 5 6, respectively. On the shaft 19 are keyed two pinions, 24 24′.

25 26 are sliding pinions on the screws 22 23, respectively.

27 28 are two "idle" pinions with wide teeth, and are both in gear with the pinion 24. The pinion 25 is movable either in or out of gear with pinion 24′, or in or out of gear with pinion 27, or out of gear with both of these pinions. When the pinion 25 is in gear with pinion 24′, the intermittent rotation of the shaft 19 imparts similar rotation to the screw 22 in one direction; and when the pinion 25 is in gear with pinion 27, the intermittent ro-

tation of the shaft 19 imparts similar rotation to the screw 22 in the other direction. When the pinion 25 is out of gear both with pinion 24′ and pinion 27, no automatic rotation is imparted to the screw 22. The automatic rotation of the screw 23 is, through the intervention of the pinions 24, 24′, 26, and 28, regulated in a similar manner to that of the screw 22.

50 is a grooved shaft for actuating mechanism such as is commonly employed for imparting vertical and diagonal "feed" to the cutting-tools. This shaft is driven from shaft 19 by means of the pinions 51 52, as shown in Fig. 3, the pinion 51 being free to slide upon the shaft 19, for the purpose of being put in or out of gear with pinion 52.

The intermittent rotation of the screws 22 23 imparts feed-traverse to the tool-slides 5 6, respectively, and it will be noticed that this feed-traverse is imparted while the work which is being operated upon is traveling backward under the cutting-tools; hence it is desirable that the cutting-tools should be lifted clear of the work while the feed-traverse is being imparted to them, and this object is attained as subsequently described.

29 is a rock-shaft having two arms which are acted upon alternately by the horn *b* of stop 7, and by an adjustable stop, 30, according as the table is traversing either forward or backward, respectively. The rock-shaft 29 is thus caused to vibrate to and fro, so as at suitable intervals to shift the driving-belt from one fast pulley to the other through the intervention of a shaft, 31, connecting-rod 32, grooved shaft 33, connecting-rod 34, belt-fork 35, and respective levers, as shown.

36 37 are the two fast pulleys of the machine, and 38 is the loose pulley.

When the shaft 33 is actuated in the direction requisite for reversing the forward movement of the table 3, it causes the cutting-tools to be lifted clear of the work, through the intervention of levers 39 40, (which are connected to each other by a connecting-rod,) grooved shaft 41, and levers 42 43, which are connected by chains to levers 44 45, respectively keyed upon the respective pivots of the two cutting-tool holders. The cutting-tools are retained in the lifted position during the whole of the backward movement of the table 3, and are lowered by the action of gravity when the reverse movement of the lifting mechanism (simultaneously with the reversal of the backward movement of the table 3) is effected, as will be readily understood. The levers 39 42 43 are free to slide endwise along the grooved shafts which carry them as occasion requires.

According to the systems usually employed the actuation of the feed mechanism has to take place while the work is passing backward and forward through a clearance-space immediately before each cut is commenced, whereas, according to the present improvements, the whole or any part of the period occupied by each backward movement of the table may be utilized in actuating the feed mechanism; hence, as under the existing systems the time which is available for actuating the feed mechanism only admits of a comparatively narrow width of cut being taken, the present improvements greatly extend the maximum power of the machine in this respect, and do not reduce the minimum width of cut which may be imparted. Moreover, as such a much longer time is allowed, according to the present improvements, in which to effect the movements of the feed mechanism, the movements are made with comparative slowness, and the wear and tear of the mechanism are correspondingly diminished.

46 47 are the two screws for lifting and lowering the cross-slide 4, and they are connected with the shaft 14 (which moves intermittently in one direction only, as already described) by a shaft, 48, and bevel-wheels, as shown, there being a clutch, 49, for throwing the connecting mechanism in or out of gear, as required. The clutch 49 is actuated by a clutch-fork, shaft, and hand-lever, as shown in Fig. 2. Thus it will be seen that when the machine is in operation the screws 46 47 are operated automatically (each in one direction only) when the clutch 49 is in gear. The direction in which the screws 46 47 rotate when operated automatically is that which serves for lifting the cross-slide 4, the lowering of the cross-slide being effected by hand, the handle being applicable to either of the shafts 49 and 50.

What I claim is—

1. In a planing-machine, the combination of the reciprocating bed having horn *a*, and stop 8, with a sliding rack, 10, having stops 9 and 9′, shaft 14, and the intermediate mechanism between said rack and shaft for imparting intermittent rotary motion in one direction only to said shaft, substantially as set forth.

2. In a planing-machine, the combination of the reciprocating bed having horn *a* and stop 8, a sliding rack having stops 9 and 9′, spur-wheel 11 upon a horizontal shaft, bevel-wheels 12 and 13, ratchet-wheel 16, pawl 18, disk 17, and shaft 14, substantially as and for the purpose set forth.

3. In a planing-machine, the combination, with a sliding rack moved to and fro by adjustable stops upon the table, and imparting by intermediate mechanism an intermittent rotary motion in one direction only to a shaft, of such intermediate mechanism, and the mechanism for lifting the cross-slide, substantially as set forth.

4. In a planing-machine, the combination of the reciprocating bed provided with suitable stops, a sliding rack moved to and fro by said stops, the spur-wheel 11, actuated by said rack, bevel-wheels 12 and 13, ratchet-wheel 16, pawl 18, disk 17, shaft 14, wheels 49, and shaft 48, substantially as set forth.

5. In a planing-machine, the combination of a reciprocating bed carrying adjustable

stops 7 and 30, rock-shaft 29, shaft 41, the intermediate mechanism, substantially as described, connecting said tappet-lever and shaft, and levers 42, 43, 44, and 45, substantially as and for the purpose set forth.

6. In a planing-machine, the combination of the reciprocating bed, the sliding rack, and the mechanism for imparting motion from said bed to said rack, the shaft 14, and the mechanism between said rack and shaft, with the tool-slide, the mechanism for actuating the same, the cross-slide, and the mechanism for raising the same, substantially as set forth.

7. In a planing-machine, the combination of a sliding rack moved to and fro by adjustable stops on the reciprocating bed, and serving, through its connections, to actuate the feed mechanism and lift the cross-slide, and the said connections with the mechanism operated by a rock-lever to lift the tool or tools during the backward movement of the table, substantially as set forth.

8. In a planing-machine, the combination of the reciprocating bed provided with stops, a sliding rack actuated by said stops, an intermittently-rotating shaft, and the intermediate mechanism between said rack and shaft, with the mechanism for actuating the tool-slides, the mechanism for raising the cross-slide, and the mechanism for lifting the tool or tools during the backward movement of the reciprocating bed, as set forth.

WILLIAM W. HULSE.

Witnesses:

GEO. WM. FOX,
Solicitor, Manchester.

H. C. CARNS,
Patent Agent, 10 Norfolk Street, Manchester.