

(No Model.)

2 Sheets—Sheet 1

A. GORDON.

RECIPROCATING METAL PARING MACHINE.

No. 579,976.

Patented Apr. 6, 1897.

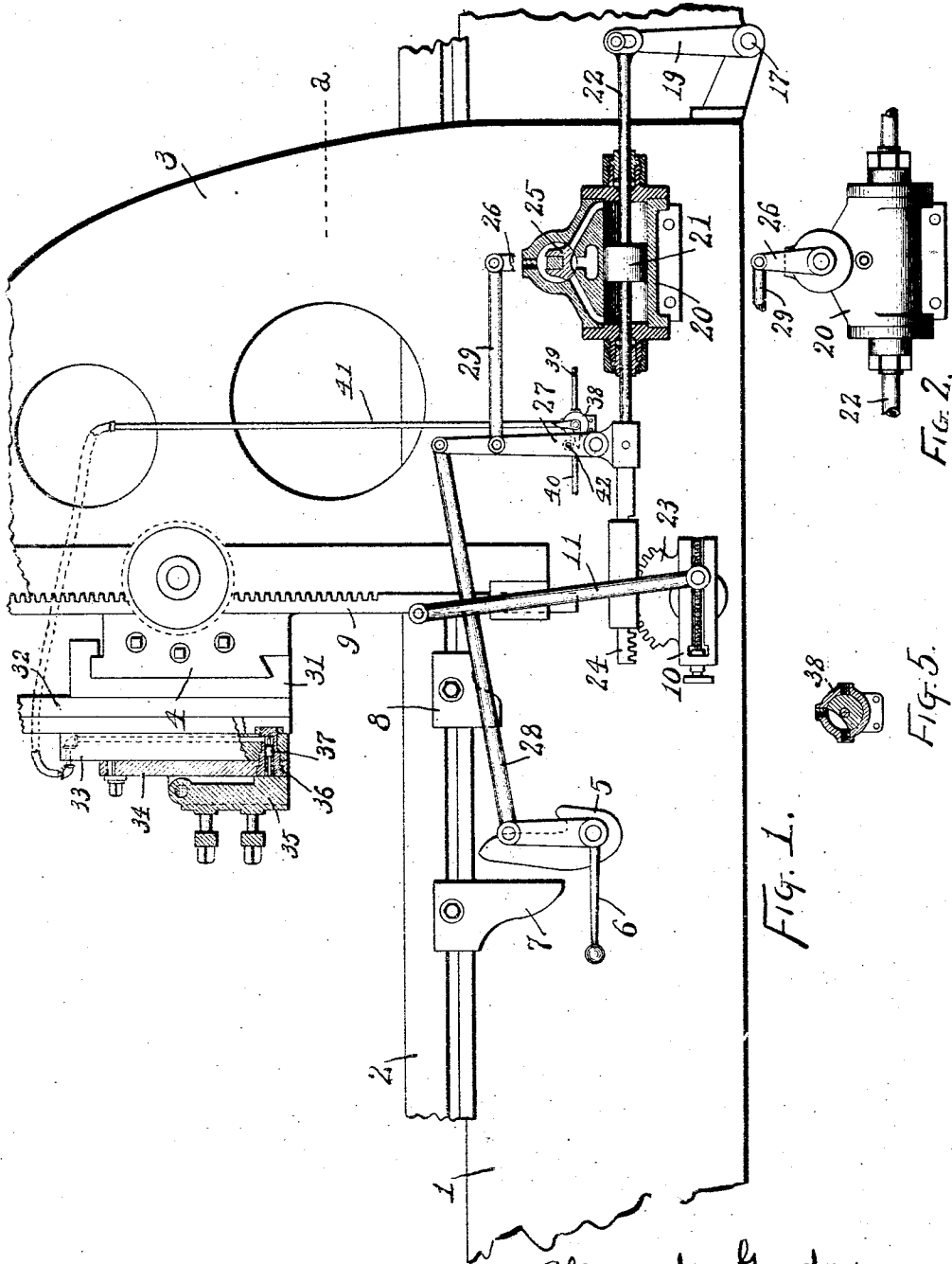


Fig. 1.

Fig. 2.

Fig. 5.

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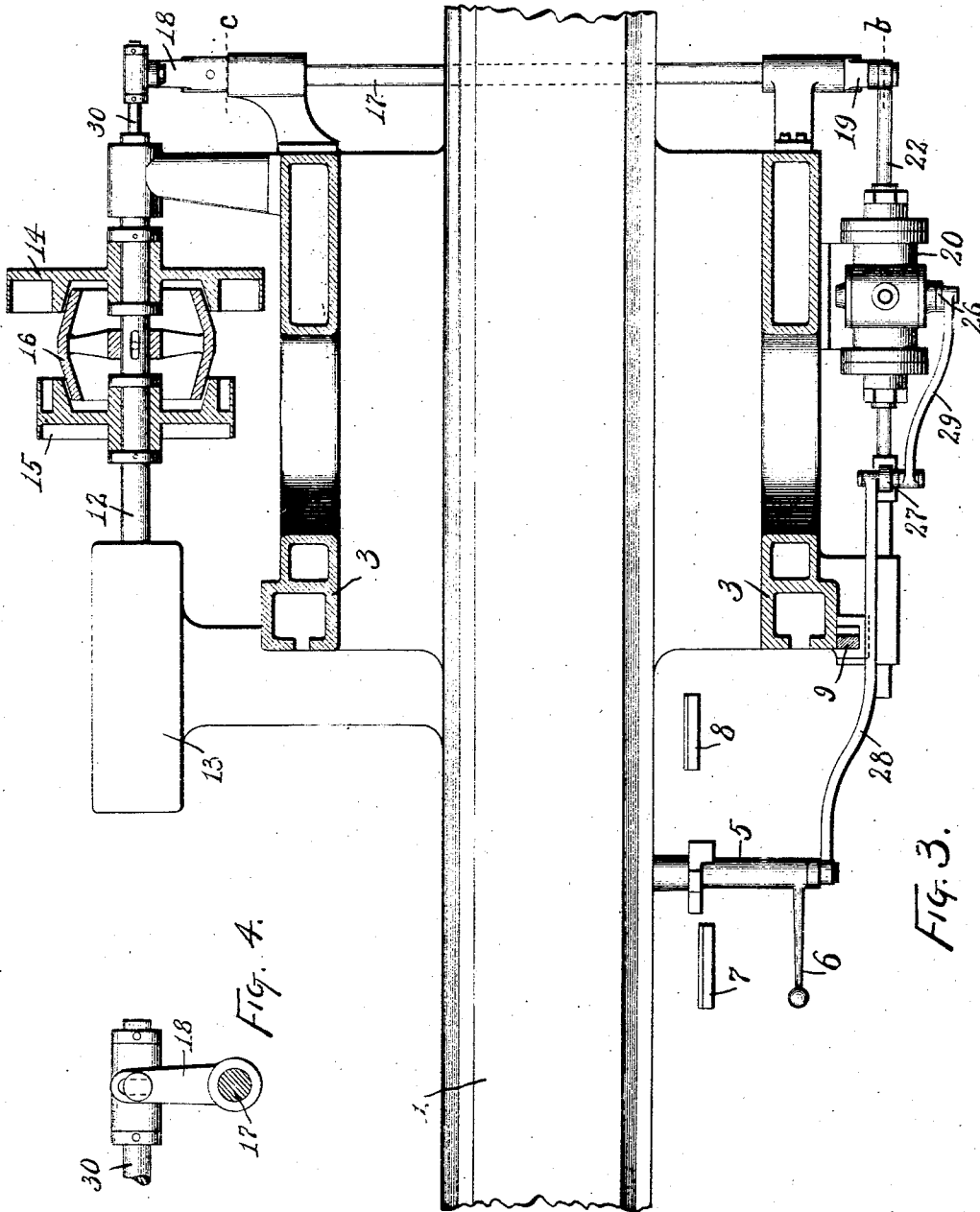
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UNITED STATES PATENT OFFICE.

ALEXANDER GORDON, OF HAMILTON, OHIO, ASSIGNOR TO THE NILES TOOL WORKS COMPANY, OF SAME PLACE.

RECIPROCATING METAL-PARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 579,978, dated April 6, 1897.

Application filed November 30, 1896. Serial No. 613,850. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER GORDON, of Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Reciprocating Metal-Paring Machines, of which the following is a specification.

This invention pertains to improvements in reciprocating metal-paring machines of that general class exemplified by planing-machines and slotting-machines. In machines of this class, especially in the larger sizes, there has been a modern tendency toward increase in working speeds and in rate of feed. The prompt reversal of reciprocating parts at high speed and the production of extensive feed-motions have been seriously limited or rendered difficult by the practice of deriving the reversing and feeding motions from the reciprocating part at or during the reversal at a time when the operating-power mechanism was virtually disconnected from the reciprocating part, the momentum of the reciprocating part being depended upon to produce the desired effects. Again, great difficulty has been experienced in securing a satisfactory relieving motion for the tool during the backing stroke, and the numerous complicated devices which have been contrived for this purpose have been so inefficient and troublesome that they are seldom employed, notwithstanding the recognized desirability of positively relieving the tool on the backing-stroke. In my improved system I provide for effecting the reversal of motion, or the production of the feeding motion, or the relief of the tool, or all of these, by means of a force extraneous to that employed in giving the reciprocating motion. I employ a pneumatic engine whose sole duty it is to move certain parts pertaining to the reversal or feeding or tool-relieving, and I impose upon the main reciprocating part of the machine only the trifling duty of moving the valve of this pneumatic engine.

My invention readily lends itself to planing-machines, shaping-machines, and slotting-machines, and the particular character of driving mechanism employed in the machine, as well as the particular character of feeding mechanism, is immaterial.

For purposes of exemplification I show my

invention in connection with a planing-machine of ordinary type having usual driving mechanism and usual feeding mechanism.

My invention will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of a metal-planing machine embodying my invention, the pneumatic engine appearing in vertical section in the plane of line *b* of Fig. 3; Fig. 2, a side elevation of the pneumatic engine; Fig. 3, a plan of the planer, portions appearing in horizontal section in the plane of line *a* of Fig. 1; Fig. 4, a side elevation of the clutch-arm, the clutch-shaft appearing in vertical transverse section in the plane of line *c* of Fig. 3; and Fig. 5, a vertical section of the tool-relieving valve.

In the drawings, 1 indicates the planer-bed; 2, the planer-table; 3, the housings; 4, the rail; 5, the reversing-tumbler; 6, the reversing-handle; 7, the backing-dog; 8, the cutting-dog; 9, the feed-rack; 10, the feed-tumbler; 11, the link connecting the feed-tumbler with the feed-rack; 12, the driving-shaft; 13, the incased worm-gear, driven, as usual, by a worm on the driving-shaft; 14, the cutting-pulley loose on the driving-shaft; 15, the backing-pulley loose on the driving-shaft; 16, the clutch, adapted to lock either pulley to the driving-shaft; 17, the clutch-throwing rock-shaft; 18, clutch-arm on this shaft; and 19 a main arm on the clutch-throwing rock-shaft.

All of the parts thus far referred to are as usual in worm-driven planers having the driving-shaft at one side of the machine and the tumbler at the other side of the machine and a rock-shaft crossing the machine for transmitting shifting motion to the clutch.

Proceeding with the drawings, 20 indicates the cylinder of a pneumatic engine; 21, its piston; 22, its piston-rod connected to arm 19 of the reversing mechanism; 23, the usual segment of the feed-tumbler; 24, a rack gearing therewith and connected with piston-rod 22; 25, the controlling-valve of the pneumatic engine; 26, the valve-arm; 27, an arm mounted at its base on a pivot carried by piston-rod 22; 28, a link connecting the upper end of

this arm with reversing-tumbler 5; 29, a link connecting valve-arm 26 with an intermediate portion of arm 27, and 30 the clutch-rod connecting clutch 16 with clutch-arm 18.

5 The pneumatic engine is to be supplied with compressed air from any suitable source of supply. With the parts in the position shown in Fig. 1 the planer is at rest. If tumbler 5 be thrown to the left by hand, valve 25 will obviously admit air to the left of the piston, and the piston will move to the right, throwing the clutch into engagement with cutting-pulley 14, and the planer-table will proceed to make its cutting stroke while the clutch is held in engagement by the pressure on the piston. When, at the termination of the cutting stroke, backing-dog 7 rocks tumbler 5 to the right, then valve 25 will be reversed and the piston will move to the left and cause the clutch to lock the backing-pulley 15 to the driving-shaft and cause the planer to make its backing stroke, and so on, the pneumatic engine causing a reversal of the direction of driving motion each time its valve is reversed under the influence of one of the dogs, the piston not only adjusting the clutch for the proper direction of motion, but holding the clutch into engagement. It is obvious that the movement of the piston not only thus effects the reversal of motion of the table, but effects also the proper motion of the feed mechanism, and it will be apparent that the shifting of the clutch and the holding of the clutch into engagement and the operation of the feed calls upon the planer-table only for such slight power as is necessary to move the valve of the pneumatic engine. The power and promptness of the shifting and the feeding motions are thus independent of the amount of energy stored in the reciprocating table.

In reversing the machine by hand, as by operating handle 6, only sufficient power need be applied to operate the valve of the pneumatic engine, the engine itself performing the real work of reversing the clutch and operating the feed.

When the planer-table is in motion in either direction, tumbler 5 is at one or the other of its extremes of motion. If under these conditions it be desired to stop the planer, the tumbler need only be brought to the neutral position by means of handle 6. With the parts in the position shown in Fig. 1 this would put valve 25 to neutral position, and we must assume that the piston was at one extremity of its stroke. Hence it would appear that putting the tumbler and valve to neutral position would not necessarily move the piston to neutral position and release both clutches; but when the piston is at one extremity of its stroke and the tumbler is moved to neutral position the result is not the placing of the valve in neutral position, but the reversal of the valve by reason of the operation of arm 27, and the reversal of the valve causes the piston to start on its stroke, and

when it reaches mid-stroke the motion of the lower end of arm 27 will have put the valve to mid-position, leaving the parts all in neutral position and the planer at rest.

Proceeding with the drawings, 31 indicates the usual saddle, 32 the swing, 33 the tool-slide, 34 the apron-box, 35 the apron, all of these parts being constructed as usual; 36, the pivot-bolt as usually employed in uniting the apron-box to the slide, so as to permit the apron-box to be adjusted to angles, this pivot-bolt in the present instance, however, being bored to form a small air-cylinder within it; 37, a piston working in this cylinder and having its piston-rod projecting forwardly, so as to engage the rear of the apron; 38, a three-way cock or valve; 39, the inlet to this valve from the source of supply of compressed air; 40, exhaust-pipe from this valve; 41, a conduit leading from the three-way valve to the cylinder formed within pivot-bolt 36 behind piston 37; and 42, a stud on lever 27, adapted as piston-rod 22 reciprocates to engage a lever on the stem of the three-way valve and turn it to one or the other of its extreme positions.

When the planer is at rest, and also when it is making its cutting stroke, conduit 41 is in communication with the exhaust 40, and consequently there is no air-pressure behind piston 37, and that piston is inert and the apron is free to occupy its normal position. When piston 21 moves to the right and causes the planer to begin its backing stroke, then pin 42 turns valve 38, so that the air-pressure is admitted behind piston 37, whereupon the piston moves forward and lifts the apron and gives the proper relief to the cutting-tool. When the planer motion is reversed and the cutting stroke begins, then valve 38 again opens the exhaust and relieves the pressure at the rear of piston 37, allowing the apron to again fall. A spring may, if desired, be added to piston 37 to move it rearwardly when the exhaust takes place, so as to impose less duty upon the apron as the apron falls to normal position preparatory to the cut.

I claim as my invention—

1. In a reciprocating metal-paring machine, the combination, substantially as set forth, with the main reciprocating part thereof, the driving mechanism thereof, the reversing device for said mechanism, and the dogs actuated by said main reciprocating part of a pneumatic engine, a connection from the piston of said engine to said reversing device, and a connection from the valve of said engine to said dogs.

2. In a reciprocating metal-paring machine, the combination, substantially as set forth, with the main reciprocating part, its driving and reversing mechanism and the feed mechanism of the machine, of a pneumatic engine, a connection from the piston of said engine to said feed mechanism, and a connection from the reversing mechanism of the machine to the valve of said engine.

3. In a reciprocating metal-paring ma-

chine, the combination, substantially as set forth, with the main reciprocating part of the machine, the driving and reversing mechanism thereof, feed mechanism of the machine, 5 and the dogs actuated by said main reciprocating part, of a pneumatic engine, connections from the piston of said engine to said reversing and feed mechanisms, and connections from the valve of said engine to said 10 dogs.

4. In a reciprocating metal-paring machine, the combination, substantially as set forth, with the main reciprocating part of the

machine, the driving mechanism therefor, the reversing device for said mechanism and the 15 swinging apron, of a pneumatic cylinder, a piston therein, connections between said piston and the swinging apron of the machine, a controlling-valve for said cylinder, and connections between said controlling-valve and 20 the reversing mechanism of the machine.

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