Aug. 4, 1936. J. DE KONING 2,050,087

MECHANISM OPERATED BY FLUID PRESSURE

Filed March 13, 1936 2 Sheets-Sheet 1

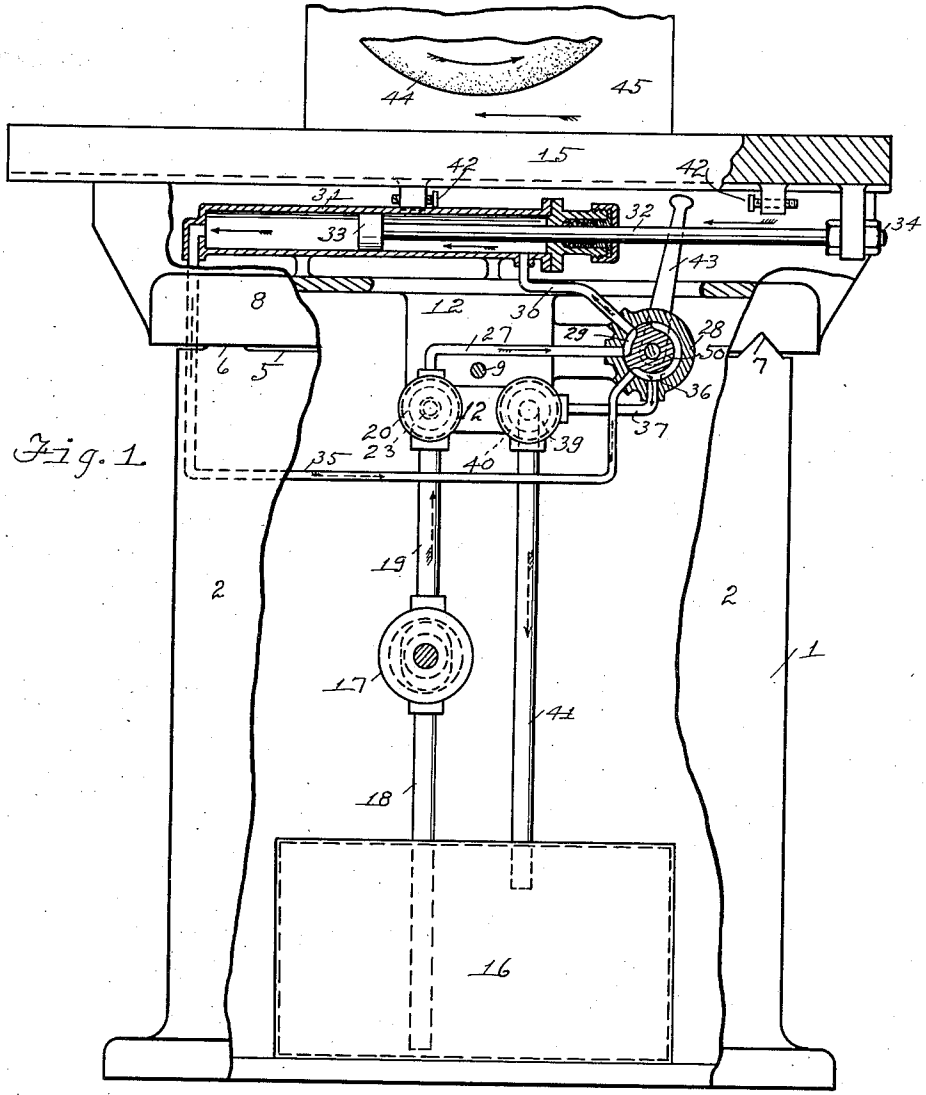


Fig. 1.

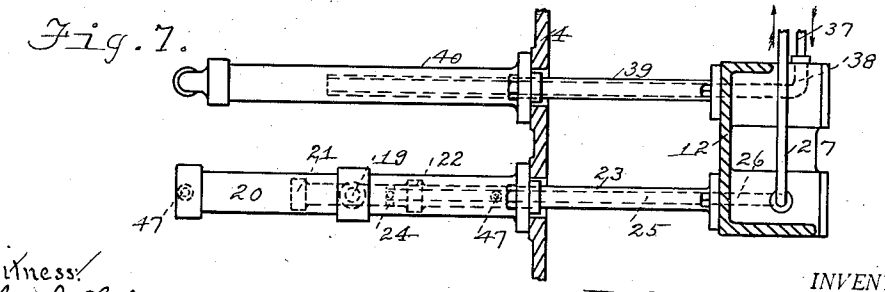


Fig. 7.

Witness:
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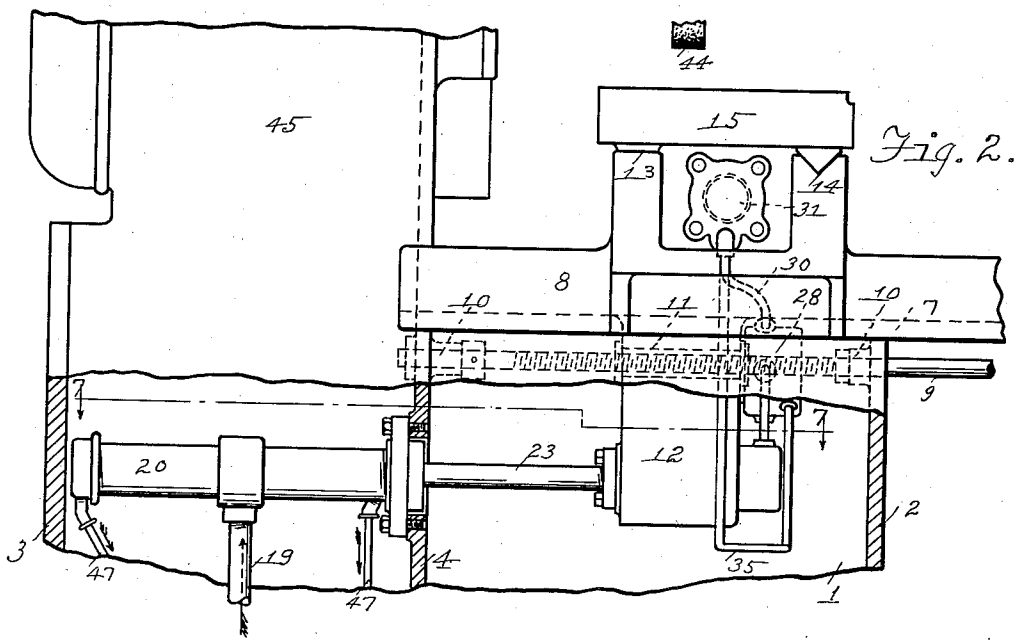


Fig. 2.

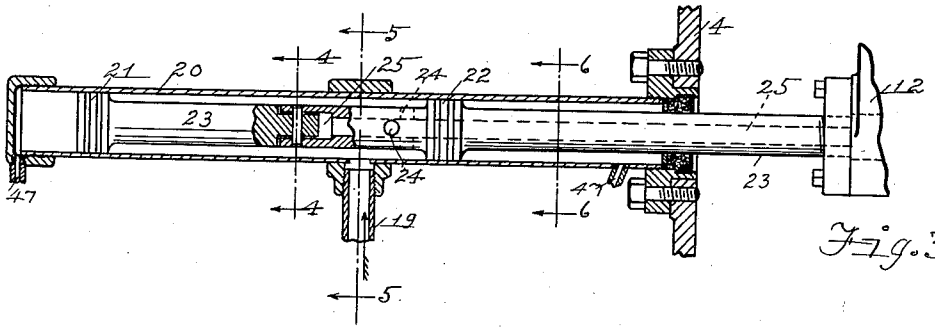


Fig. 3.

Fig. 4.

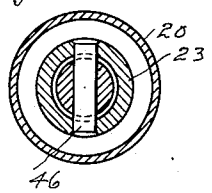


Fig. 5.

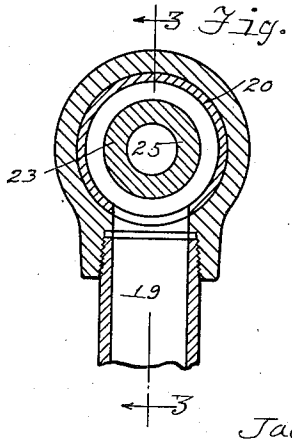
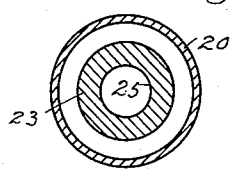


Fig. 6.



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UNITED STATES PATENT OFFICE

2,050,087

MECHANISM OPERATED BY FLUID PRESSURE

Jacob DeKoning, Grand Rapids, Mich., assignor to Gallmeyer & Livingston Company, Grand Rapids, Mich., a corporation of Michigan

Application March 13, 1936, Serial No. 68,666

9 Claims. (Cl. 51—233)

The present invention relates to fluid pressure-operated machines; and its object is, generally, to provide improved means for operating by fluid under pressure a machine having relatively movable parts or elements; and more particularly, to provide in such a machine a conduit for the fluid composed of rigid members of metal or the like; and further, to provide in such a machine passages or pipes in and connecting said movable parts whereby their movement by such a conduit may be effected.

This and any other and more specific objects hereinafter appearing are attained by, and the invention finds preferable embodiment in, the illustrative structure and mechanism particularly described in the body of this specification and illustrated by the accompanying drawings, in which:

Figure 1 is an elevational front view of a surface grinding machine, its upper portion and the middle portion of its front wall being broken away, the cylinder which has a piston for reciprocating its work-carrying table being shown in axial section and the valve structure controlling the operation thereof being shown in transverse section;

Figure 2 is an elevational left hand-side view of upper portions of the same, partially broken away, the front wall of the machine and other parallel walls being shown in vertical section;

Figure 3 is an axial sectional view, taken on line 3—3 of Figure 5, of a conduit for fluid under pressure passing between relatively movable parts or elements of the machine;

Figure 4 is a transverse sectional view of said conduit taken on line 4—4 of Figure 3;

Figure 5 is a transverse sectional view thereof taken on line 5—5 of Figure 3;

Figure 6 is a transverse sectional view of the same taken on line 6—6 of Figure 3;

Figure 7 is a top plan view of the same and of the parallel conduit for exhausting or returning the fluid, certain parts being shown in horizontal section taken on line 7—7 of Figure 2.

In these drawings is illustrated a machine having three parts or elements relatively movable in transverse directions, the particular machine shown being a "surface grinding machine", having means for thus moving said parts by fluid under pressure, including a conduit comprising rigid relatively movable members of metal or the like.

The illustrated machine has a hollow base or supporting portion 1 with vertical walls—the front wall 2, rear wall 3 and intermediate wall 4—and the horizontal top 5 which has the usual ways 6, 7 on which the member 8 is slid or reciprocated by suitable means as the shaft 9 journaled at 10 in the base and threaded in the nut sleeve indicated at 11 in the downwardly extending portion 12 of the slidable member 8. This member has the usual ways 13, 14 on which the work-carrying table 15 is reciprocated in a direction transverse to the sliding movement of said member 8.

The said table is thus reciprocated by fluid pressure operating through the following means. From a tank 16 in the hollow base 1, containing a suitable fluid, as oil, the fluid is pumped by a rotary pump indicated at 17 through the pipes 18, 19 into the cylinder portion 20 of a conduit, said cylinder being mounted on the vertical wall 4 of the base. The fluid enters this cylinder between the spaced heads 21, 22 of the hollow piston portion 23 of the conduit and passing through the holes 24 of this piston and along its central bore 25 and the communicating passage 26 in the depending portion 12 of said member 8 and through the pipe 27 enters the valve casing 28 mounted on said portion 12.

In the position of the parts seen in Figure 1 the fluid passes through the passage 29 in the rotary valve 50 and thence through the pipe 30 into the cylinder 31 mounted on said member 8 and slides the work table 15 toward the left hand-side of Figure 1 by this cylinder's piston 32 having the head 33 and connected at 34 with said table. In this movement, the fluid in this cylinder at the left hand-side of said piston head is expelled or exhausted through the pipe 35 leading therefrom into the passage 36 of the valve 50 and thence through the pipe 37, its communicating passage 38 in said portion 12 of the slidable member 8 and through the pipe 39, its telescoping pipe 40 and its downward extension 41, thus discharging the fluid into the tank 16. In the oppositely turned position of the rotary valve 50 the fluid passes from the pipe 27 through the pipe 35 and into the left hand-end of cylinder 31 to move the piston 32 toward the right hand-side of Figure 1 thus sliding the table 15 and reversing its previous movement. In this movement the fluid in the right hand-end of this cylinder is exhausted passing through the pipes 30, 37, 39, 40, 41.

The rotary valve 50 is turned to its opposite positions in the usual manner by the movement of the work table 15 whose adjustably threaded stops 42 strike the lever arm 43 of this rotary valve in the opposite movements of said table respectively.

It will be seen that said conduit's cylinder portion 20 and hollow piston portion 23 move rela-

tively to each other and with the movement of the slidable member 8 on the base 1 and that the fluid discharge telescoping pipes 39, 40 being parallel with said conduit move in the same manner; and that the movement, in either direction, of the piston portion 23 in the cylinder portion 20 of said conduit is balanced and in nowise resisted or interfered with by the fluid in said cylinder because the piston heads 21, 22 carry the fluid in the cylinder with and between them in such movements. It is manifest that relatively movable parts or elements of various machines may be connected by such a conduit for the like purpose. The said conduit is composed of rigid metallic parts throughout, whereby the use of a flexible pipe of rubber or the like as hitherto employed for the passage of fluid under pressure from one to another part or element of a machine, is obviated.

The machine's grinding wheel is indicated at 44, and a motor for driving the same at 45.

The piston 23 may have portions loosely jointed by a pin 46 as shown to provide certain flexibility, and vents 47 are shown at the ends of cylinder 20 to discharge oil leakage therefrom.

The invention being intended to be pointed out in the claims, is not to be limited to or by details of construction and arrangement of the particular embodiment thereof illustrated by the drawings or hereinbefore described.

I claim:

1. In a machine which includes a basic first part, a second part operatively movable reciprocatingly thereon and a third part having an operative reciprocating movement on said second part transverse the movement thereof, means for reciprocating said third part by fluid under pressure, comprising: a cylinder carried by said first part having a medial fluid inlet; a piston connected with said second part having spaced piston heads in the cylinder on the opposite sides respectively of said inlet and a fluid passage leading therefrom; a cylinder carried by said second part containing a piston connected with said third part; a valve casing carried by said second part; fluid passages leading from the passage in the first-mentioned piston to the valve casing and from said casing to the second-mentioned cylinder; a reversing valve in said casing movable to opposite positions for reciprocating said third part.

2. In a machine which includes a basic first part, a second part operatively movable thereon and a third part having an operative reciprocating movement on said second part transverse the movement thereof: fluid-operated means carried by said second part and connected with said third part for reciprocating the same; a valve carried by said second part for controlling said means; a fluid conduit comprising reciprocating members one of which is carried by said first part and has an inlet for fluid under pressure the other member being carried by said second part, said members and said second part having passages affording fluid communication between said inlet and said means controlled by said valve.

3. In a machine which includes a basic first part, a second part operatively movable thereon and a third part having an operative movement on said second part transverse the movement thereof; means carried by said second part and connected with said third part for moving the same by fluid under pressure; a continuous passage for said fluid to said means including a conduit having reciprocating members carried by said first and second parts respectively.

4. In a machine which includes a basic first part, a second part operatively movable thereon and a third part having an operative movement on said second part transverse the movement thereof; means carried by said second part and connected with said third part for moving the same by fluid under pressure; a continuous passage for said fluid to said means including a conduit having reciprocating members carried by said first and second parts respectively; a continuous passage for exhausting the fluid from said means including reciprocating members parallel with said first-mentioned members and carried by said first and second parts respectively.

5. In a surface grinding machine having a base, a platen operatively movable reciprocatingly on the base and a work-carrying table having an operative reciprocating movement on the platen transverse the movement thereof, means for reciprocating the table by fluid pressure, comprising: a cylinder carried by the base having an inlet for fluid under pressure; a piston connected with the platen having a longitudinal fluid passage leading from the interior of the cylinder; a cylinder carried by the platen having a piston connected with the table for reciprocating the same; a continuous fluid passage leading from the passage in the first-mentioned piston to the second-mentioned cylinder; a reversing valve carried by the platen for controlling said passage.

6. In a surface grinding machine having a base, a platen operatively movable reciprocatingly on the base and a work-carrying table having an operative reciprocating movement on the platen transverse the movement thereof, means for reciprocating the table by fluid pressure, comprising: a cylinder carried by the base having an inlet for fluid under pressure; a piston connected with the platen having a longitudinal fluid passage leading from the interior of the cylinder; a cylinder carried by the platen having a piston connected with the table for reciprocating the same; a continuous fluid passage leading from the passage in the first-mentioned piston to the second-mentioned cylinder; a reversing valve carried by the platen for controlling said passage; means operated by the movement of the table for moving the valve to move the table in alternately opposite directions.

7. In a machine which includes a basic first part, a second part operatively movable thereon and a third part having an operative movement on said second part; means carried by said second part and connected with said third part for moving the same by fluid under pressure; a continuous passage for said fluid to said means including a conduit having reciprocating members carried by said first and second parts respectively.

8. In a machine which has relatively movable parts: means for thus moving said parts by fluid under pressure; means for supplying fluid under pressure to the first-mentioned means for operating the same, including a conduit for the fluid which comprises a cylinder carried in connection with one of said parts having a medial fluid inlet, and a piston connected with the other one of said parts having spaced piston heads in the cylinder at the opposite sides respectively of said inlet and a fluid passage leading from the cylinder between the piston heads.

9. In a machine which has parts relatively

movable reciprocatingly: means for thus moving said parts by fluid under pressure; means for supplying fluid under pressure to the first-mentioned means for operating the same, including a conduit for the fluid which comprises a cylinder carried in connection with one of said parts having a medial fluid inlet, and a piston connected with the other one of said parts having spaced piston heads in the cylinder at the opposite sides respectively of said inlet and a fluid passage leading from the cylinder between the piston heads.

JACOB DEKONING.