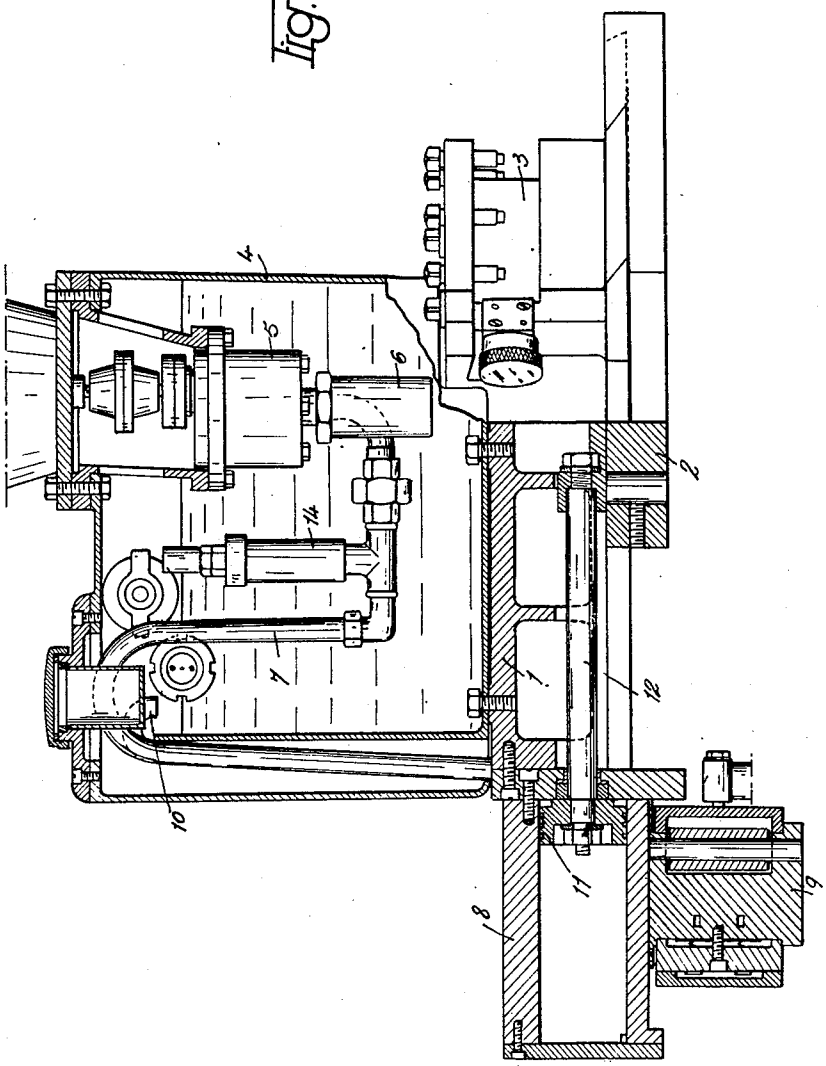
March 9, 1954 H. R. BRUET 2,671,432

CONTROL FOR DUPLICATING LATHE CUTTING TOOLHOLDERS

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Fig. 1



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Fig. 3

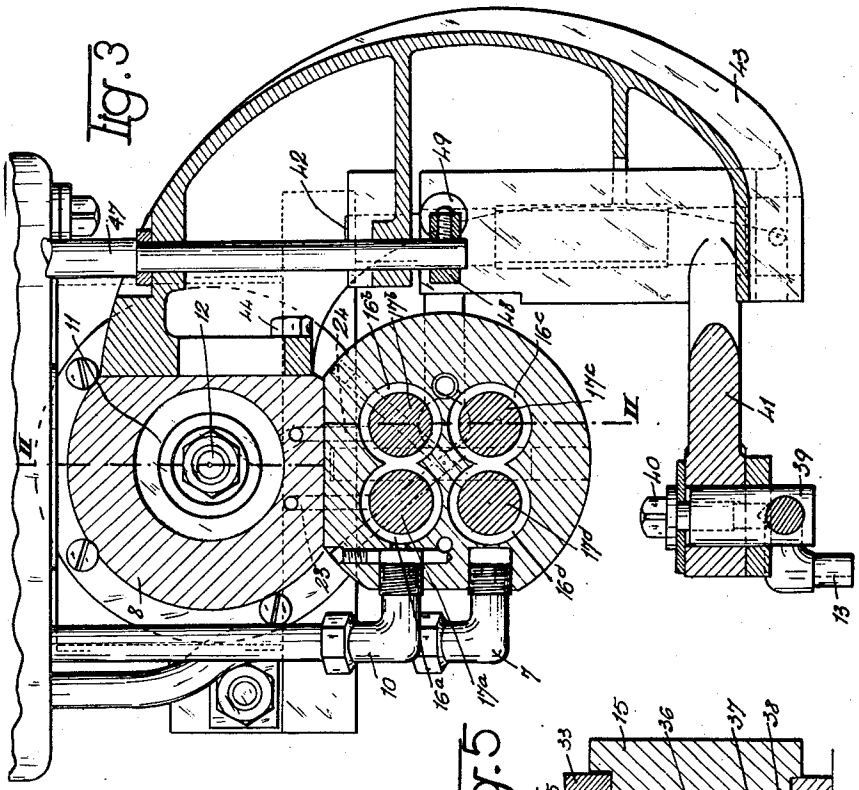


Fig. 5

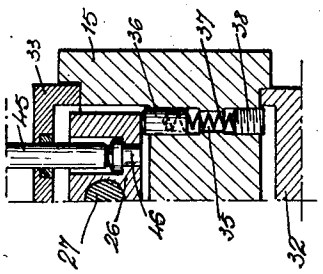
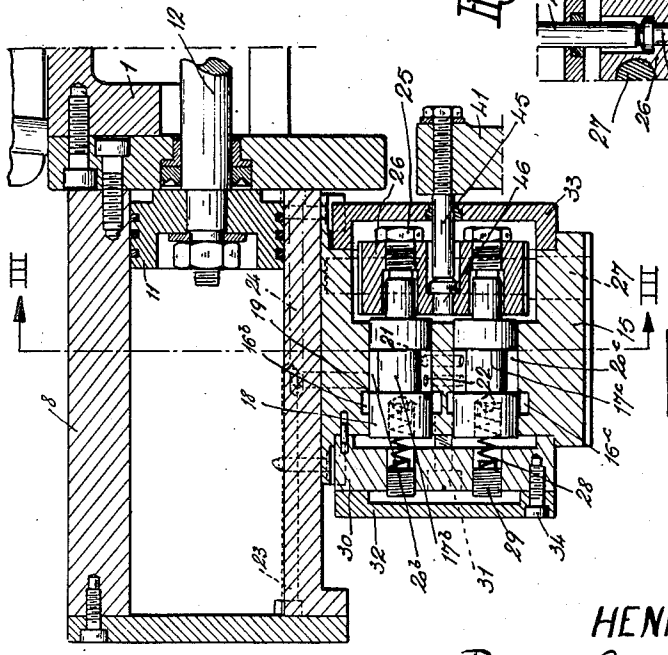


Fig. 2



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Fig. 7

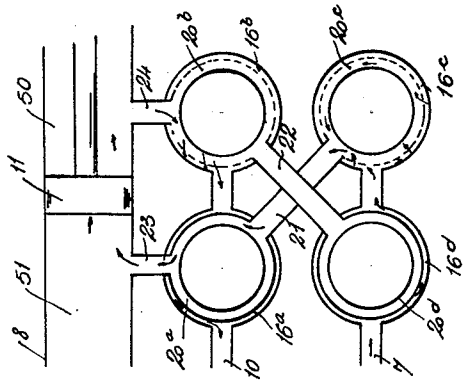


Fig. 6

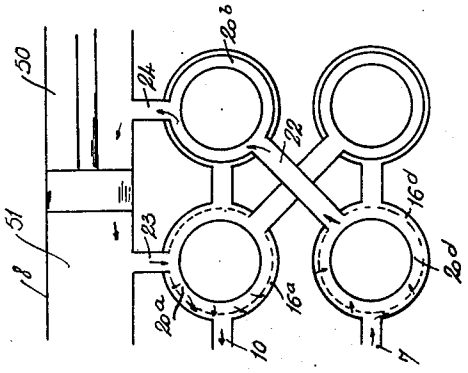
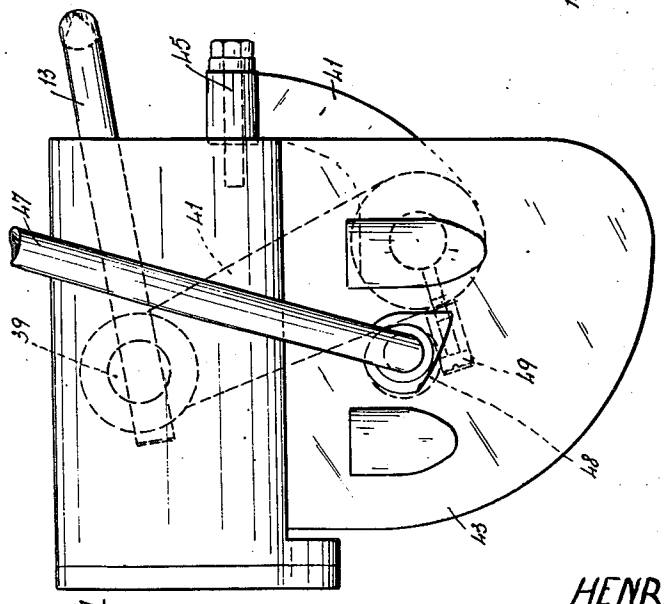


Fig. 4



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2,671,432

CONTROL FOR DUPLICATING LATHE CUTTING TOOLHOLDERS

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Application February 8, 1952, Serial No. 270,665

Claims priority, application France February 8, 1951

2 Claims. (Cl. 121—45)

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This invention relates to automatic reproducing-lathes in which the tool-holder support is controlled through hydraulic transmitting means, comprising a movable control cylinder and a fixed piston mounted therein, and a feeler in contact with a model-piece or template, carried by the same frame as the tool-holder support. The object thereof is a feeder of a simple and advantageous construction permitting to achieve the control very accurately.

A feeder according to the invention comprises four piston valves having pistons controlled by a tumbler so that when two of said valves are open, the other two are closed, and reversely, two of the valves that are in the same position being intended to be placed on pipes respectively connecting the inletting of a feeding fluid in one of the chambers of the control cylinder of the reproducing lathe and the outletting of said fluid into the second chamber or opposite chamber of said cylinder, while the other two valves are intended to be placed on pipes respectively connecting the inletting of the feeding fluid to the second chamber of the cylinder and the pushing back of said fluid to the first chamber of said cylinder, the tumbler being urged by elastic means to the position corresponding to the contact of the feeler and the tool respectively with the model-piece or template and the rough-shaped piece to be machined and being mechanically connected to the feeler, so that when the latter is in contact with the model-piece or template it may cause the tumbler to pivot against the action of said elastic means.

When the feeler comes into contact with the model-piece or template, it causes the tumbler to pivot in opposition to the action of the elastic means producing a very small backward motion of the frame carrying the feeler and the tool. Such a very small backward motion produces a slight pivoting of the feeler in a reverse direction to the previous pivoting one, which causes the tumbler to resume its initial position and the feeler resumes its former contact with the model-piece. This process is constantly repeated so that the tool forms out of the rough-shaped piece to be machined a piece similar to the template. As the position of the pistons of the valves with respect to the tumbler can be adjusted so that the travel of said pistons may be very short, the sensitiveness of the feeler is very great and its motions are at once imparted to the tool so that the machined piece is quite similar to the template.

The diameter of the head of the piston of each

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valve will preferably be scarcely greater than that of the boring in which the body of the valve is slidable. Owing to this fact, the strength required for the opening of a valve is very small.

A particular embodiment will now be described with reference to the attached drawings by way of example which is in no way limitative, of a reproducing-device with hydraulic transmitting means and provided with a feeder according to the invention; of course, all the characteristics appearing from the description and the drawings are part of the invention.

In the drawings:

Fig. 1 is a vertical cross-section of the reproducing device.

Fig. 2 is a vertical cross-section of the feeder along II—II of Fig. 3.

Fig. 3 is a vertical cross-section perpendicular to that of Fig. 2.

Fig. 4 is a plan view thereof.

Fig. 5 is a horizontal cross-section of a detail.

Figs. 6 and 7 are diagrammatical illustrations of the operation of the present device.

The reproducing assembly shown on Fig. 1 comprises a frame 1 mounted to be slidable on a bed-plate 2 integral with the transverse carriage of the lathe. On the frame 1, are secured, on the one hand, a tool-holder support 3 and, on the other hand, a fluid-tight reservoir 4 containing the feeding fluid which may be oil, for instance, in which is provided a pump 5 connected to a motor not shown on the drawings. The inletting pipe of the pump 5 opens in a filter 6 bathing in the feeding fluid while the back flow pipe 7 is connected to a cylinder 8 secured on the frame 1 through a feeder referred to, in a general way, as 9; the oil is pushed back through a pipe 10. In the cylinder 8 is mounted slidable a piston 11 whose rod 12 is fixed at its extremity to the bed-plate 2. The feeder is controlled through a feeler 13, as will be later on described and 14 is a delivery valve.

The feeder (Figs. 2 to 5) comprises a case 15 in which are provided cylindrical housings having each a wider part 16a, 16b, 16c or 16d. The recesses 16a and 16b, on the one hand, and 16c and 16d, on the other hand, communicate with each other. In each of said recesses is mounted a slidable piston 17a, 17b, 17c or 17d, a part of which is wider, such as 18, and has a slightly greater diameter than the recess with which it cooperates so that the annular edge 19 of said recess serves as a valve-seat. The bodies of the pistons have a diameter comparatively smaller than the cylindrical recess so that between said

bodies and the walls of the recesses are provided annular spaces 20*a*, 20*b*, 20*c* and 20*d*. The annular spaces 20*a* and 20*c* communicate with each other through a pipe 21. In the same way, the annular spaces 20*b* and 20*d* communicate with each other through a pipe 22. The annular spaces 16*d* and 16*a* are respectively connected to the back flow pipe 7 of the pump 5 and to the delivery pipe 10. On the other hand, each annular space 20*a* and 20*b* is connected to one extremity of the cylinder 8 respectively through a pipe 23 and a pipe 24.

The pistons 17 are held at one extremity by adjustable bolts 25 screwed in a tumbler 26 mounted for rotation in a case 15 about a shaft 27. Said pistons are retained against the screws 25 by springs 28 interposed between said pistons and adjustable abutments 29 screwed in a piece 30 fixed on the case 15 by means of a screw 31. It is apparent that when the pistons 17*a* and 17*d* are in their open position, the pistons 17*b* and 17*c* are in their closed position or reversely. The screws 25 are so adjusted that the travel of the pistons be very short, of the range of a few mms. The case 15 is closed at its extremities by lids 32 and 33 fixed by screws such as 34.

In a recess 35 of the casing 15 is mounted slidable a pusher-piece 36 pressing on the tumbler 26 by means of a spring 37 fixed by an adjustable abutment 38. Said push-piece tends to retain the tumbler in the position corresponding to the open position of the pistons 17*a* and 17*d* during which the tool is in contact with the rough-shaped piece as will be explained later on.

The feeler 13 is jammed in the boring of a rod 39 fixed by a bolt 40 on one extremity of a lever in the shape of a fork 41. The latter is pivotably mounted on a shaft 42 in an auxiliary frame 43 fixed to the cylinder 8. The other extremity of the lever 41 has a pawl 45 in contact with a teat nut 46 secured in the tumbler 26 eccentrically with respect to the shaft 27 of said tumbler. A hand control lever 47 is mounted pivotably in the frame 43 and carries a cam-shaped piece 48 cooperating with a pawl 49 fixed on the lever 41 so that when the lever 47 pivots in the proper direction it causes the lever 41 to pivot also.

A feeder according to the invention operates in the following way: supposing, to begin, it is in the position shown on the drawings, the tumbler 26 is urged by the spring 37 into the position corresponding to the open position of the pistons 17*a* and 17*d* and the other two, in their closed position. Then the oil flows into the chamber 50 of the cylinder through the pipe 7, the annular spaces 16*d* and 20*d*, the pipe 22, the annular space 20*b* and the pipe 24 while the oil held back in the opposite chamber 51 of the cylinder flows back to the reservoir 4 through the pipe 23, the annular spaces 16*a* and 20*a* and the pipe 10. The frame 1 then changes place with respect to the bed-plate 2 until the tool and the feeler 13 are in contact with the rough-shaped piece and the template respectively.

Then the feeler 13 causes the lever 41 to pivot, which, in turn, produces the pivoting of the tumbler 26 against the action of the spring 37 so that the pistons 17*b* and 17*c* take their open position and the other two their closed position (Fig. 7). The oil pressure created by the pump 5 is then transmitted to the chamber 51 of the cylinder through the pipe 7, the annular spaces 16*d*, 16*c* and 20*c*, the pipe 21, the annular spaces 20*a* and the pipe 23, while the chamber 50 is caused to communicate with the reservoir 4 through the pipe 24, the annular spaces 20*b*, 16*b* and 16*a* and the pipe 10. Thus is the tool driven away from the rough-shaped piece until the feeler leaves the template and the tumbler 26 resumes its former position under the action of the spring 37.

The process which has just been described takes place again; the tool thus forms out of the rough-shaped piece to be machined a piece identical to the template. As the pivoting angle of the tumbler 26 is very small, the displacement of the feeler 13 is transmitted practically at once to the tool and the piece machined by it is strictly identical to the template.

The operation of the lever 47 permits to make the lever 41 pivot in the direction corresponding to the stopping of the working tool.

It is obvious that any modification can be made in the embodiment which has been described without departing from the limits of the invention.

What I claim is:

1. In a lathe duplicator mechanism including a cutting tool controlling piston and cylinder therefor, a piston control valve comprising a cylinder block having two pairs of bores provided therein, said cylinder block further having a pair of passageways each connecting a bore from each pair thereof together, said cylinder bores each having an annular recess in the wall defining said bore with the recesses of each pair of bores being in communication, means for introducing fluid under pressure to a recess of a bore of one of said pairs thereof, said cylinder block having a further pair of passageways for being connected to said cylinder on opposite sides of said piston with each passageway connected to a bore of the second pair thereof, a plurality of pistons each having a reduced portion and being slidably mounted in one of said bores, a tumbler for reciprocating said pistons and arranged for moving one piston of each of said pair of bores in one direction for closing off the recesses of said bore with the remaining pistons moving in an opposite direction for having their reduced portion providing a passageway between their respective bore recesses and said interconnecting passageways, template controlled means for moving said tumbler, resilient means tending to move said tumbler for holding the pistons of one pair of bores in their recess closing position, said cylinder block having an exhaust passageway connected to a bore of said second pair thereof, and means tending to move said pistons towards said tumbler.

2. In a lathe duplicator mechanism including a cutting tool controlling piston and cylinder therefor, a piston control valve comprising a plurality of cylinders, a plurality of pistons each slidably mounted in one of said cylinders and having a recessed medial portion, said cylinders each having an annular recess provided in the bore wall at one end portion thereof for being closed by the head of its respective piston and opened by the recessed portion of said piston, one of said cylinders having an inlet port for connection to a source of fluid under pressure, a second cylinder having an outlet port, said inlet cylinder having its bore recess in communication with the bore recess of a third cylinder, said outlet cylinder having its bore recess in communication with the bore recess of a fourth cylinder, said inlet cylinder having a medial portion of its bore in communication with a medial por-

tion of the bore of said fourth cylinder, said outlet cylinder having a medial portion of its bore in communication with a medial portion of the bore of said third cylinder, said outlet cylinder further having a port provided in a medial portion of the bore thereof for being in communication with an end portion of the bore of said controlling piston cylinder, said fourth cylinder having a port provided in a medial portion of the bore thereof for being in communication with the opposite end portion of the bore of said controlling piston cylinder, a shaft mounted laterally of said pistons, a tumbler pivotally mounted on said shaft and arranged for reciprocating said pistons with the pistons of said outlet and inlet cylinders moving together in an opposite direction to the pistons of said third and fourth cylinders, resilient means tending to

hold said pistons against said tumbler, template controlled means for pivoting said tumbler and resilient means tending to hold said tumbler with the pistons of said inlet and outlet cylinder in their recess opening position.

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