

March 6, 1934.

P. VON PECHMANN

1,950,332

HYDRAULIC ACTUATING MEANS FOR LATHE SLIDES

Filed Aug. 17, 1932

2 Sheets-Sheet 1

Fig. 1

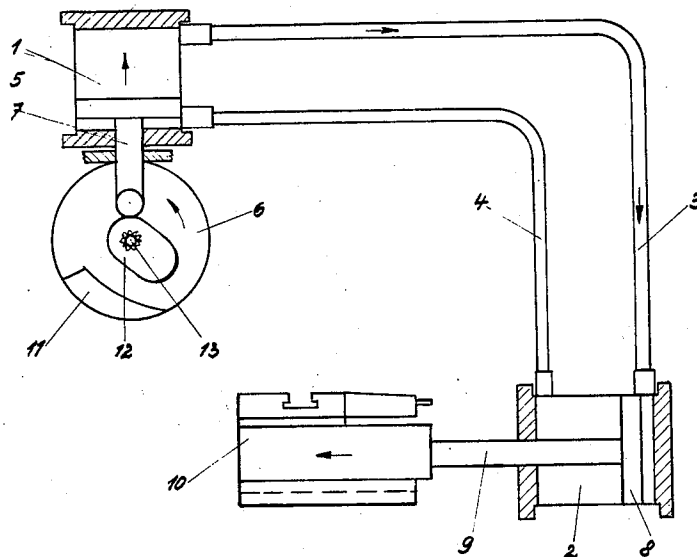
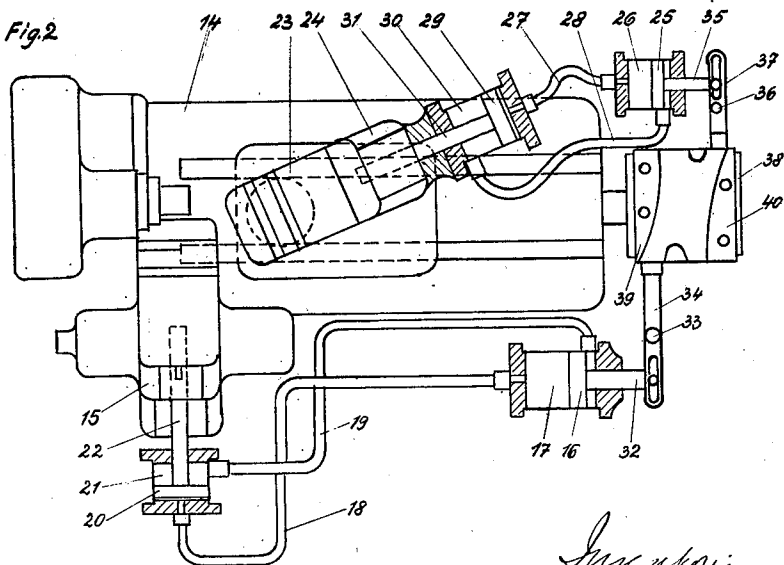


Fig. 2



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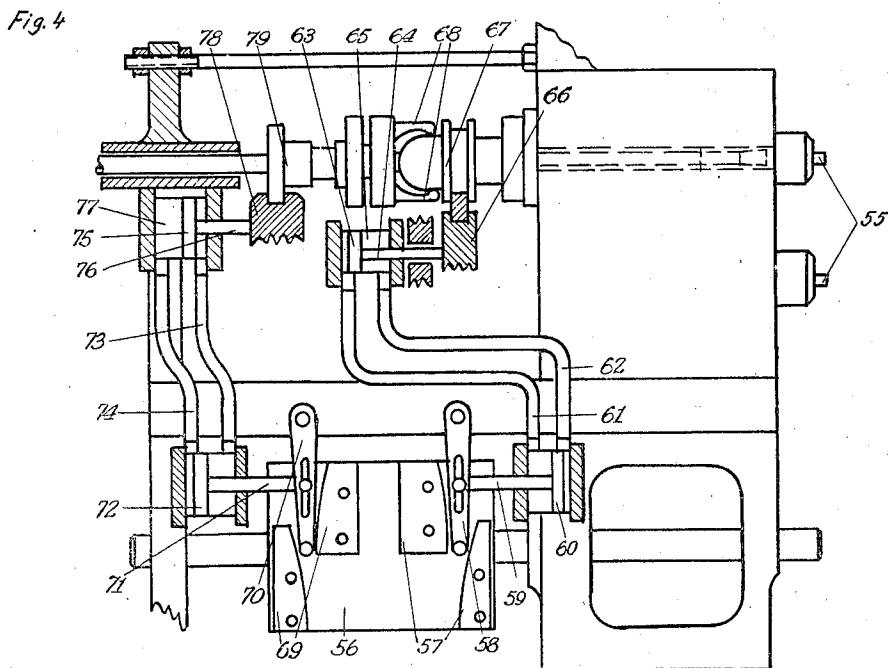
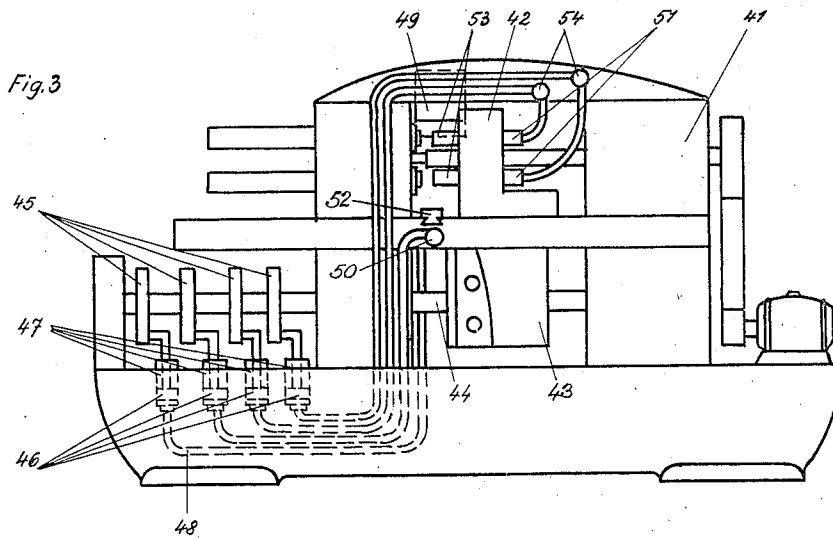
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HYDRAULIC ACTUATING MEANS FOR LATHE SLIDES

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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HYDRAULIC ACTUATING MEANS FOR
LATHE SLIDES

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Application August 17, 1932, Serial No. 629,226
In Germany August 19, 1931

5 Claims. (Cl. 32-2)

An application has been filed in Germany, August 19, 1931.

When actuating multiple, conjunctively acting slides, tools, feed and spring chucks etc. on semi automatic and full automatic lathes it is common to use a single pump drive or a series of such drives.—

In accordance with the present invention, instead of several pump drives, there is used a pair of double acting pressure columns, which in themselves are known. These may consist, in simplified construction of two oil columns between two pistons. Thus, every part to be actuated possesses its own drive, closed in its form, and independent of the constant capacity of the pumps, and very simple in comparison with purely mechanic drives. The driving pistons of these oil columns can be, moreover, shifted by derivation from a common element, e. g. a shaft. By these means a timed and fixed sequence of working operations is effected;—also, the actuating of all movements is done from any point whatever. This point in such connection with the tubings may be located without difficulty in a way that no other action such as the chip discharge, is hampered. Furthermore, by using flexible tubing, an angular setting of the slides is possible. Finally, a timed adjustment of the operations and a change in the length of the operating movements can be obtained by means of adjustable and interchangeable cams or similarly acting elements. The invention is illustrated by examples of its application and schematic plans showing in

Figure 1 a schematic view of a mechanism for actuating a single slide as constructed in accordance with this invention;

Figure 2 a schematic plan view of the invention as applied to a semi-automatic lathe;

Figure 3 a schematic side elevation of the mechanism as applied to a full automatic lathe; and

Figure 4 a schematic side elevation of part of a second form of automatic lathe and showing the invention applied thereto.

A simplified, double acting oil column consists, as it is known, of two cylinders 1 and 2, Fig. 1, which are connected together by two rigid or flexible tubes 3 and 4. When the piston 5 located between the two oil columns 3 and 4 is moved upward by a partial rotation of the cam disc 6 acting on the piston rod 7, the liquid in the tube 3 will move the piston 8, likewise located between the two oil columns 3 and 4, toward the left. The piston rod 9 is connected with the slide

10, which slides in the direction of the arrow in working movement. Continuing the rotation of the cam disc 11, the piston 5 will be drawn back, and thus the liquid in pipe 4 will move the piston 8 and the connected slide 10 backwardly. Thereby the completion of the cycle of working and return movement is effected. The views do not show the suction and safety valves which may be used to prevent losses of liquid and danger of breaking.

In order to allow to vary the sequence of movements of different slides of this kind and to change the length of their stroke, in accordance with this invention, the cam disc 6, for example, can be provided with a toothed opening 12 fitting on a toothed shaft 13; by these means the cam discs can be arranged in selected positions on the shaft 13, and, where several of these devices are used in one machine, each cam may be selectively arranged to produce timed action of the several discs. The mode of application of several of such oil columns in accordance with the invention is illustrated in Figure 2 upon a semi automatic lathe. The cross slide 15 located upon bed 14 is actuated by the reciprocation of the piston 16 in cylinder 17; this being done by means of the oil columns in the pipes 18 and 19 in connection with the piston 20 in cylinder 21 and the piston rod 22. In the same manner, the longitudinal slide 23 upon bed 14, swiveling in the assumed case upon a base 24, is impelled by reciprocation of the piston 25 in cylinder 26; this being done by the oil columns in the flexible tubings 27 and 28, as well as by piston 29 in cylinder 30, attached to the slide base 24, and the piston rod 31. The reciprocations of piston 16 on the one side and of piston 25 on the other side are effected by the cams 39 and 40 fixed upon the drum 38 acting on the levers 34 and 37 which are pivoted respectively at 33 and 36 and connected respectively to the piston rods 32 and 35. Also in the present case, cams may be removed or interchanged.

Furthermore, Figure 3 shows the possibility of applying the invention to full automatic lathes with rotating work pieces and a chuck holding the work pieces. Upon the upper part of bed 41 the longitudinal slide 42 is moved to and fro by means of the cam drum 43 which is rotated by shaft 44. Upon the same shaft there are located a series of cam discs 45, similar to disc 6 in Figure 1. These discs actuate a corresponding number of pistons 46 in cylinders 47, which by two tubings 48 each actuate the pistons in the cylinder groups 50 and 51, also in conformity with

Figure 1. The piston in cylinder 50 actuates the cross slide 52 and the pistons in cylinders 52 actuate the tools 53 in the longitudinal slide 42. For the latter purpose, the tubing must be flexible and pivot around point 54. Furthermore, it is possible to actuate, also, the top slide 49 and other moving elements hydraulically, arranging other cams for controlling further hydraulic control devices upon a counter-shaft running parallel to shaft 44 and receiving its motion from it.

Figure 4 shows, as an example, the actuation of feeding and spring chucks used on a full automatic lathe with rotating, stationary work pieces 55. The cams 57 fixed upon the revolving drum 56 actuate the piston rod 59 and piston 60 by means of lever 58. Thereby piston 63 with piston rod 64 is pushed forward and backward in the cylinder 65 by the oil columns in tubes 61 and 62. The piston rod 64 bears a guiding disc 66 (shown cut off in the sketch), connected to the clamping nut 67 of every spindle by a pin and groove connection. By its movement to and fro each chucking nut actuates the opening and closing of the chucking fingers 68 in the well known manner. The other cams 69 attached to the drum 56 actuate the piston rod 71 together with piston 72 by means of lever 70. Thus, by the oil columns in pipes 73 and 74 the piston 75 together with piston rod 76 is shifted to and fro. Piston rod 76 bears a grooved disc 78 (shown cut-off in sketch) which is connected to the feeding mechanism of every spindle. The reciprocation of the element 79 controls by means of the usual tubular clutches the feed of the working pieces in the well known manner.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A machine tool of the kind described having a main drive, a plurality of slides for operating devices of the group including working, clamping and feeding devices, and an arrangement for automatically shifting said slides into and out of operative position, comprising working cylinders and pistons moving therein, each working cylinder being operatively connected to a single slide, power cylinders, two connecting pipe lines between each of the respective power and working cylinders, pistons in the power cylinders, curved guides actuated from the main drive of the machine, and connecting rods connecting the guides and power pistons for driving the power pistons by means of the curved guides.

2. A machine tool of the kind described having a main drive, a plurality of slides for operating devices of the group including working, clamping and feeding devices, and an arrangement for automatically shifting said slides into and out of operative position comprising working cylinders and pistons moving therein, each working cylinder being operatively connected to a single slide,

power cylinders equal in number to the working cylinders, two connecting pipe lines between each of the respective power and working cylinders, pistons in the power cylinders, curved guides actuated from the main drive of the machine, and connecting rods connecting the guides and power pistons for driving the power pistons by means of the curved guides.

3. A machine tool of the kind described having a main drive, a plurality of slides for operating devices of the group including working, clamping and feeding devices, and an arrangement for automatically shifting said slides into and out of operative position, comprising working cylinders and pistons moving therein, each working cylinder being operatively connected to a single slide, power cylinders equal in number to the working cylinders, two connecting pipe lines between each of the respective power cylinders and working cylinders, a cam for each of the power pistons, a common shaft for all of the cams driven from the main drive of the machine, and connecting rods controlled by said cams operating the power pistons.

4. A machine tool of the kind described having a main drive, a plurality of slides for operating devices of the group including working, clamping and feeding devices, and an arrangement for automatically shifting said slides into and out of operative positions, comprising working cylinders and pistons moving therein, each working piston being operatively connected to a single slide, power cylinders equal in number to the working cylinders, two connecting pipe lines between each of the respective power and working cylinders, pistons in the power cylinders, a cam for each of the power pistons, a common shaft for all of the cams driven from the main drive of the machine, means for adjusting the individual cams with respect to the common shaft, and connecting rods actuated by the cams and operating the power pistons.

5. A machine tool of the kind described having a main drive, a plurality of slides for operating devices of the group including working, clamping and feeding devices, and an arrangement for automatically shifting these slides into and out of operative positions, comprising working cylinders and pistons moving therein, each working piston being operatively connected to a single slide, power cylinders equal in number to the working cylinders, two connecting pipe lines between each of the respective power and working cylinders, pistons in the power cylinders, a curved rib for each of the power pistons, a common drum whereon all of the curved ribs are located, said drum being driven from the main drive of the machine, means for adjustably arranging the individual curved ribs on the drum, and connecting rods controlled by said ribs and operating the power pistons.

PAUL v. PECHMANN.