Oct. 25, 1938. H. P. M. FORKARDT 2,134,227

OPERATING MECHANISM FOR CHUCKS

Filed May 20, 1936

Fig. 1.

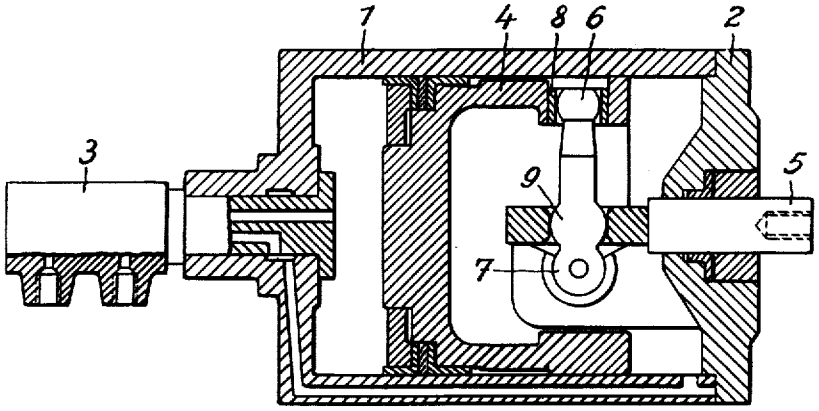


Fig. 2.

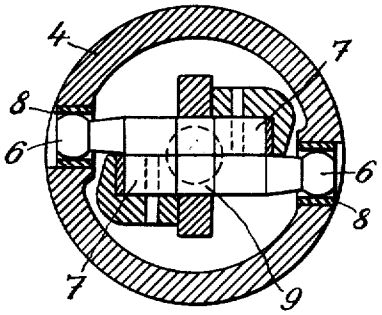
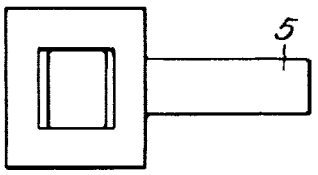


Fig. 3.



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Patented Oct. 25, 1938 2,134,227

UNITED STATES PATENT OFFICE

2,134,227

OPERATING MECHANISM FOR CHUCKS

Hermann Paul Max Forkardt, deceased, late of Dusseldorf-Oberkassel, Germany, by Lotte Forkardt, geb. Ippelsheim, legal representative, Dusseldorf-Oberkassel, Germany

Application May 20, 1936, Serial No. 80,792
In Germany May 24, 1935

2 Claims. (Cl. 121—38)

Chuck jaws on machine tools are, at the present time, closed and opened to a large extent by pressure cylinders with compressed air or oil under pressure. The diameter of these cylinders is normally such that with a single piston acting through transmission mechanism housed in the interior of the chuck a sufficient clamping force can be obtained.

With the air and oil pressures usually available it is possible to use cylinders of such a diameter that they can be housed in the majority of machine tools without difficulty. In many cases, however, the maximum diameter to be housed is extremely limited by the construction of the machine, as for example, by the spacing between the separate spindles in the case of a multi-spindle automatic machine.

Many years ago the increase in output per spindle therefore led to the use in these machines of cylinders with tandem pistons instead of single pistons so as to enable twice the pulling or pressure force to be obtained without increasing the diameter. Recently these tandem cylinders have become no longer sufficient.

The construction of cylinders with three or four pistons, however, meets with considerable difficulties in construction, apart from the intolerable increase in length. There is, therefore, a need for clamping cylinders which, without requiring increased air pressure, which is mostly obtained from a supply main, and without increasing the diameter and the length, are capable of supplying a considerably greater pulling and pressure force whilst the stroke remains the same.

This problem is solved by the present invention. At the same time the packings and air connections in the cylinder necessary for this purpose are kept down to the same dimensions as in the case of a simple cylinder, whereby the packing of the cylinder is facilitated and the air losses are reduced.

The accompanying drawing shows the clamping cylinder according to the invention in longitudinal section (Fig. 1) and in cross section (Fig. 2) through the part which effects the transmission. Fig. 3 shows the pull rod element.

The cylinder consists of the casing 1 and the cover 2. Said casing carrying on the closed end wall the tubular member for the air supply from the stationary stuffing box casing 3. The air admitted through the tubular member is passed in the usual manner through two bores of the casing 1 to the two sides of the cylinder. The two pipes lead from the stuffing box casing to a four-way cock located externally, which connects the two sides of the cylinder alternately to the compressed air pipe and to the exhaust.

By these means the piston 4, movably mounted in the casing 1, is moved alternately towards the right and towards the left and is subjected to pressure. For this purpose it is provided with suitable packings. The pressure exerted on the piston is transmitted by a pair of parallel levers 6 to the pull rod 5. The two levers are arranged symmetrically to the longitudinal axis of the piston and are mounted at one end at the point 7 in a projection of the cylinder cover 2.

The outer or free ends of the levers engage at the diametrically opposite points 8 with the inside of the skirt of the piston 4 which, for this purpose, is provided with suitable bushes, for example of hard steel, whilst at the intermediate points 9 there is formed the connection with the head of the pull rod 5. By reason of the form of the ends of the levers 6 and of the form of the levers where they engage the actuating rod 9, the levers are pivoted both to the piston skirt and to the actuating rod.

By the symmetrical arrangement of the two levers 6 all the parts: piston 4, pull rod 5 and cover 2 are loaded at the middle and liability to buckling is obviated. The lever transmission may be varied within wide limits and adapted to the conditions obtaining at any time.

It is essential that the parts which effect the transmission are located in the pressure chamber of the cylinder itself, that is to say, that they do not require any separate intermediate walls, and that these parts are further at least provided in duplicate so that the forces acting on the two freely movable parts (piston and piston rod) always co-operate as an average main force.

What is claimed is:—

1. Operating mechanism for work holding jaws of machine tools comprising a cylinder, a piston within the cylinder, and means for actuating the piston by fluid pressure, a rod passing through the cylinder and connected to the piston to be reciprocated in the movement of the piston, the connection including a pair of parallel elements independently pivoted to a part of the cylinder within the piston skirt and both connected to the rod in the longitudinal axis of the cylinder, the pivots of the elements being on opposite sides of the axis, and the elements being connected at their outer ends to the inside of the skirt of the piston at diametrically opposite points of the skirt.

2. A construction as defined in claim 1, where-

in the elements comprise a pair of levers, one pivoted at its free end to the inside of the piston skirt and at its other end to a fixed part of the cylinder on the opposite side of the central axis thereof, said lever being pivoted intermediate its ends to the actuating rod, the other lever being similarly arranged in reverse order with its free end pivoted to the piston skirt diametrically opposite to the pivot of the free end of the first mentioned lever.

LOTTE FORKARDT, GEB. IPPELSHEIM,
Legal Representative of Hermann Paul Max Forkardt, Deceased.

CERTIFICATE OF CORRECTION.

Patent No. 2,134,227. October 25, 1938.

It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the grant, and in the heading and signature to the printed specification, name of the legal representative of the deceased inventor, for "Lotte Forkardt, geb. Ippelsheim" read Lotte Forkardt, geb. Eppelsheim, as shown by the records of this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of February, A. D. 1939.

Henry Van Arsdale.

(Seal) Acting Commissioner of Patents.

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