

J. A. OLSON,
 POSITIVE GRIPPING CYLINDER.
 APPLICATION FILED APR. 15, 1918.

1,334,503.

Patented Mar. 23, 1920.
 3 SHEETS—SHEET 1.

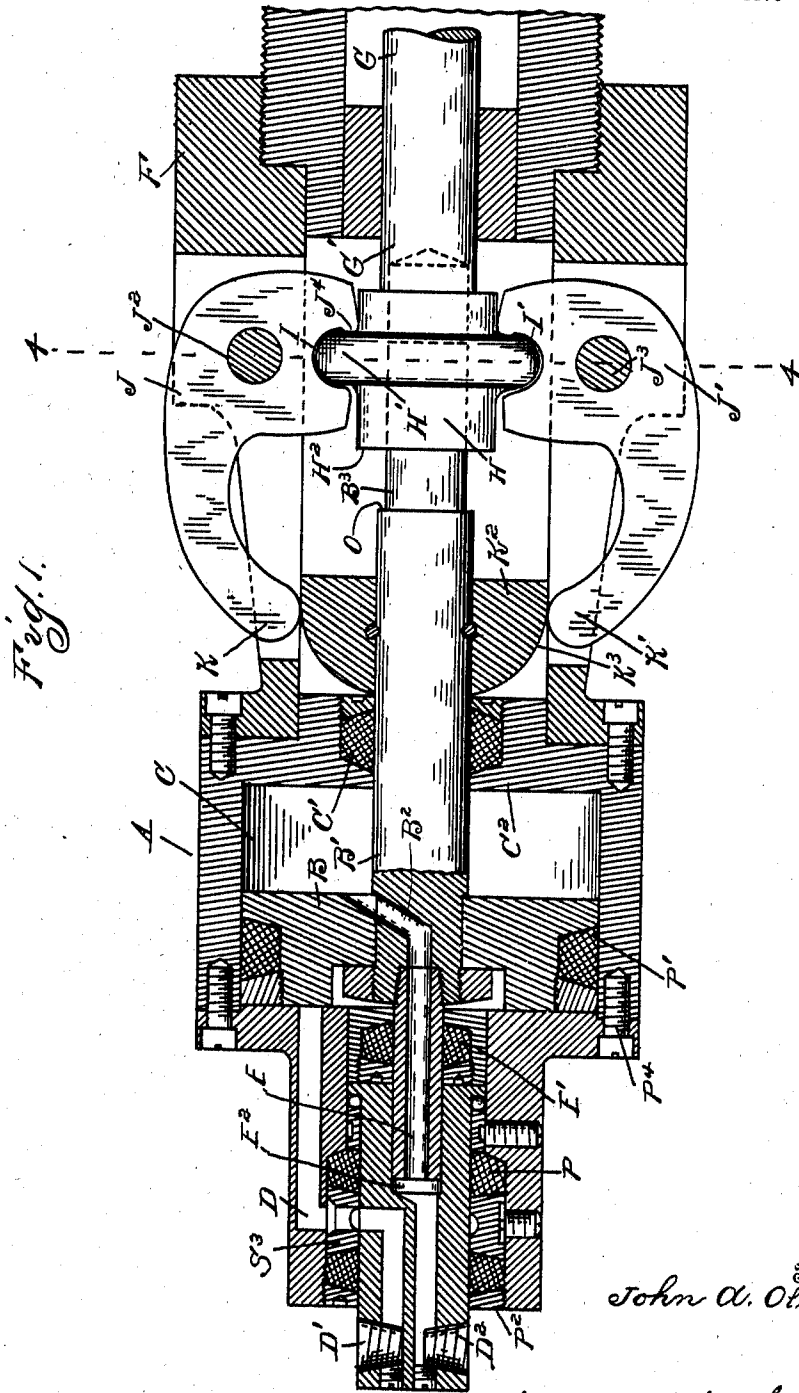


Fig. 1.

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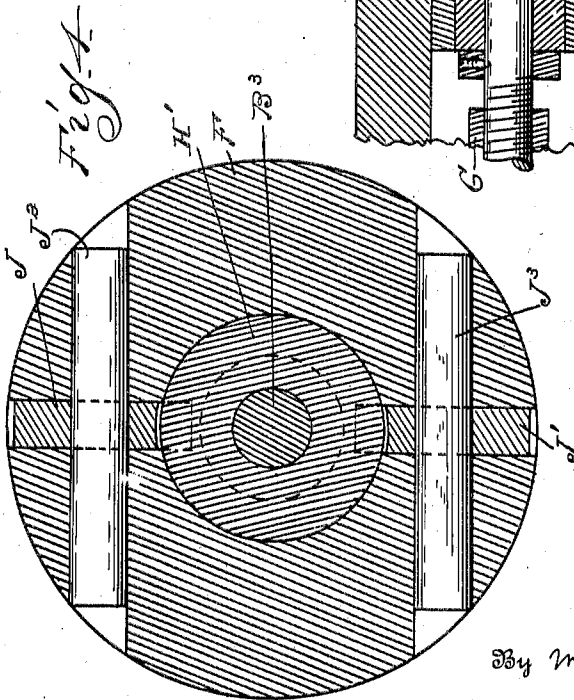
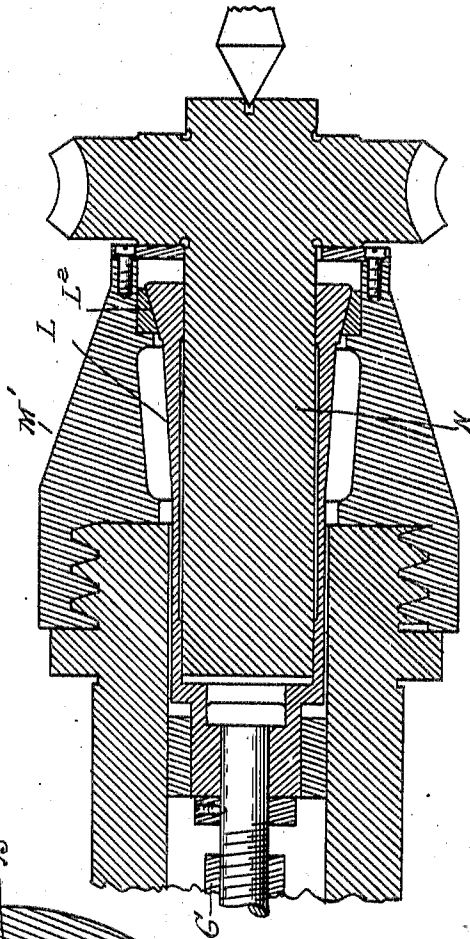
Attorneys

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Fig. 2.



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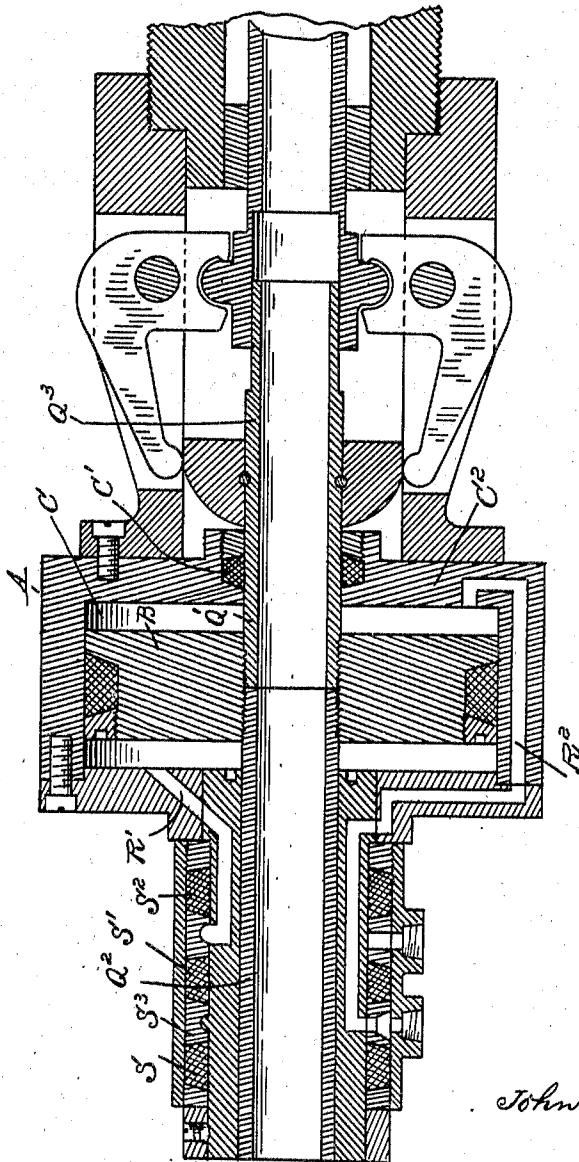
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Fig. 3.



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POSITIVE-GRIPPING CYLINDER.

1,334,503.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN A. OLSON, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Positive-Gripping Cylinders, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to positive gripping devices and refers more particularly to a gripping cylinder adapted for obtaining increased gripping power for holding the work in lathes or other rotating devices, although the invention in its broader aspects is not limited to the particular use mentioned.

Among the objects of the invention are to provide a construction wherein the draw-rod of the gripping member is formed in two separate parts, a longitudinal movement of one of which parts produces a lesser longitudinal movement of the other part; to provide a construction wherein the work is positively gripped and after once being locked will be held from release even, though the pressure in the cylinder be reduced; to provide a construction wherein less power in the cylinder is required for producing the necessary gripping action, and in which a given movement of the cylinder will preferably produce a lesser movement of the plunger rod at the work end of the device; to provide a cylinder of the character above referred to through which the work can be extended; to so construct and arrange the inlet passages to the cylinder that power will be applied on both sides of the shaft; to provide improved packing means for preventing leakage past the piston; and in general to provide an improved and simplified construction of the character above referred to.

In the drawings:

Figure 1 is a longitudinal sectional view through a device embodying my invention, parts being shown in elevation;

Fig. 2 is a view similar to Fig. 1 through the work-holding device;

Fig. 3 is a view similar to Fig. 1 showing a modified construction;

Fig. 4 is a cross-section on the line 4-4 of Fig. 1.

Describing first in detail the construc-

tion shown in Figs. 1, 2 and 4, A designates 55 a power gripping cylinder having a plunger B operating in a chamber C. This piston is connected to a draw-rod B' which projects through the packing C' in the end C² of the piston chamber. The other end of 60 the piston chamber is provided with an air inlet conduit D² and the piston B is formed with a hollow passage B², one end of which is offset diagonally to one side of the rod B', while its opposite end is connected to a 65 pipe E which extends through packing E' and telescopes with the inlet passageway E². The arrangement is such that when it is desired to propel the piston toward the end C² of the cylinder the compressed 70 air is admitted through the nipple D' to the passageway D. This forces the piston toward the right where it is held by the compressed air. When, however, it is desired to retract the piston, that is, to move it toward 75 the left, the compressed air is admitted through the nipple D² to the chamber C on the right hand side of the piston B through the passageway B². Suitable means (not shown) is provided connected to each 80 of the nipples to permit of the exhaust of the compressed air on either side of the piston.

The adjustment or reciprocation of the piston, as above described, is employed for 85 actuating a chuck or other suitable gripping device as follows: Extending into the forward projection or housing F is the free end G' of a plunger rod G. This end telescopes over a projection B³ on the end of 90 the draw-rod B' and carries a bearing member H having a ring-shaped portion H' which fits into the seats I and I' in the levers J and J'. The latter are pivoted at J² and J³ respectively to the housing F and 95 have free ends K and K' which fit over a cam-shaped member K². In constructions where the cylinder A is non-rotatable the member K² is independently rotatable on the draw-rod B', but where the whole cyl- 100 inder revolves with the work the member K² is keyed to the draw-rod B'.

At its forward end the rod G is connected in any suitable manner to the movable members L of a chuck M' or other suitable work- 105 holding device. The operation of the positive gripping cylinder as so far described is as follows: When the parts are in the

position shown in Fig. 1 the members L have been withdrawn to the left so as to force them by the action of the inclined or cam surface L² toward the center, thus gripping the spindle N of the article to be rotated. In this position the ends K and K' of the levers J and J' have been forced up on to the top of the cam member K² and will remain locked in this position until the movement of the piston B toward the right first releases and then positively forces the ends K and K' toward each other. In releasing the work from the position shown in Fig. 1, compressed air, gas or other suitable substance is admitted through the inlet D' which, acting on the piston B, forces the draw-rod B' and projection B³ toward the right. It will, however, have no effect upon the rod G (which in reality forms the second part of the two-piece draw-rod) until the shoulder O strikes against the shoulder H² on the member H. Further movement of the piston toward the right will carry the member H and rod G with it so as to shove the movable members L out from beneath the inclined surface L² and thus release the work. However, in moving toward the right, the member H, through the action of the ring H' on the seats I, will cause the ends K and K' of the levers to move down the inclined surface K³ of the cam member K².

In this position the work is released and the device is ready to grip another piece of work, which gripping action is as follows: Compressed air or other gas is now admitted through the nipple D² and passageway E to the right hand side of the cylinder. This will force the piston B to move away from the wall C² and carry with it the rod B' and cam member K², the latter riding beneath the ends K and K' will rock the levers J and J' about their pivots J² and J³. In so doing the levers will adjust the member H toward the left and pull the rod G and the movable members L of the gripping device toward the left. As the members L ride beneath the inclined surface L² they will be forced together and tightly grip the work. However, owing to the proportioning of the ends of the lever J with reference to the pivot point, a one-inch movement of the rod B' will cause only a fraction of an inch movement of the pulling rod G. Therefore a comparatively small cylinder can be employed for operating devices where considerable gripping strength is necessary, which arrangement reduces the size and cost of the gripping device.

In order to prevent the lever from being moved toward the right a sufficient distance to press against the spindle end of the machine, in a non-rotatable condition, the heel J⁴ of the member J is so arranged that it will strike against the member H and form

a locking device, preventing further movement toward the right.

It will be noticed that in addition to the packings C' and E' previously mentioned the cylinder is provided with a packing P and the piston with a packing P', these packings all being preferably of lesser width at the inner side than at the outer side and inclined outwardly so that when the locking members P² are tightened up they will wedge the packing into tight engagement with the walls and form a very efficient seal. The division between the various parts of the casing of the cylinder A is such that these packings can be conveniently put in place and the various parts of the casing and cylinder bolted together by suitable securing devices, such as the screws P⁴, this arrangement for efficiently packing the device also forming one feature of my invention.

In the construction shown in Fig. 3 the rod Q', which corresponds to the rod B', is formed hollow, being preferably made of pipe sections Q² and Q³ threaded into the plunger B. The passageways R' and R² in this construction are arranged at opposite sides of the rod Q', the passageway R² being extended around to the right hand side of the piston or plunger.

Additional packings S, S' and S² are employed in this construction and intermediate the packings S and S' there is interposed a loose collar S³ which, together with the packings S and S', forms a seal very necessary to the practical operation of the device. Otherwise the construction shown in Fig. 3 is substantially as that shown in Fig. 1, in both cases the collar S³ being employed. The construction shown in Fig. 3 is particularly adapted for use where the article operated on is of a length which makes it necessary to permit it to project through the cylinder. Various changes, however, in the details of construction and arrangements and combinations of parts can be made within the scope of my invention.

What I claim as my invention is:

1. A positive gripping device, comprising a cylinder, a piston movable in said cylinder and a draw-rod formed of two sections, one of which is connected to the piston and the other of which is connected to a work holder or the like, and a connection between said sections whereby a predetermined movement of the piston will produce a lesser movement in the same direction of the section connected to the work holder.

2. A positive gripping device, comprising a cylinder, a piston movable in the cylinder, a two-piece draw-rod, one section of which is connected to the piston and the other section of which is in alignment with said first-mentioned section and connected to the work, a cam member connected to the first-mentioned draw-rod section, a lever mechanism

nism having a portion arranged to be operated on by said cam, and a second portion arranged to actuate the second section of the draw-rod.

5 3. A positive gripping device, comprising a cylinder, a piston movable in the cylinder, a two-piece draw-rod, one section of which is connected to the piston and the other section of which is connected to the work, a
10 cam member connected to the first-mentioned draw-rod section, a lever mechanism having a portion arranged to be operated on by said cam, and a second portion arranged to actuate the second section of the
15 draw-rod through a lesser degree of movement than and in the same direction as the first-mentioned section of the draw-rod.

4. A positive gripping device, comprising a cylinder, a piston movable in the cylinder,
20 a draw-rod having alined sections, one section of which is connected to the piston and the other section of which is connected to the work, a cam member connected to the first-mentioned draw-rod section, a lever mechanism having a portion arranged to be operated on by said cam, a second portion arranged to actuate the second section of the
25 draw-rod, and means for admitting air or the like to operate said piston, said cam member and lever mechanism being arranged to form a lock for holding the work independent of the pressure in the cylinder.

5. In a positive gripping device, the combination with a draw-rod having two sections, of means for longitudinally moving one of said sections in one direction, and means actuated by said section for longitudinally moving the other of said sections in the same direction, said last-mentioned

means locking said other section in one position of longitudinal adjustment. 40

6. A positive gripping device, comprising a gripping member, a draw-rod for longitudinally adjusting said member, said draw-rod being made in sections, means for longitudinally moving one of said sections, and means for longitudinally moving another of said sections from said first-mentioned section in the same direction and at a slower rate of speed. 45 50

7. A positive gripping device, comprising a gripping member and a draw-rod for longitudinally adjusting said member, said draw-rod being made in alined sections, means for longitudinally moving one of said sections, and a lever mechanism for longitudinally moving said other section in the same direction from said first-mentioned section, said lever mechanism being arranged to give a lesser movement to said other section. 55 60

8. In a gripping device, the combination with a gripping member, of a draw-rod for longitudinally adjusting said member, said draw-rod having a section engaging said member and a second section in alinement with said first-mentioned section, means for moving said second section longitudinally in one direction, means for slowly moving said first-mentioned section in the same direction from said second section, and means for moving said second section longitudinally in the opposite direction, said second section adapted to abut against said first-mentioned section to move the latter. 65 70 75

In testimony whereof I affix my signature.

JOHN A. OLSON.