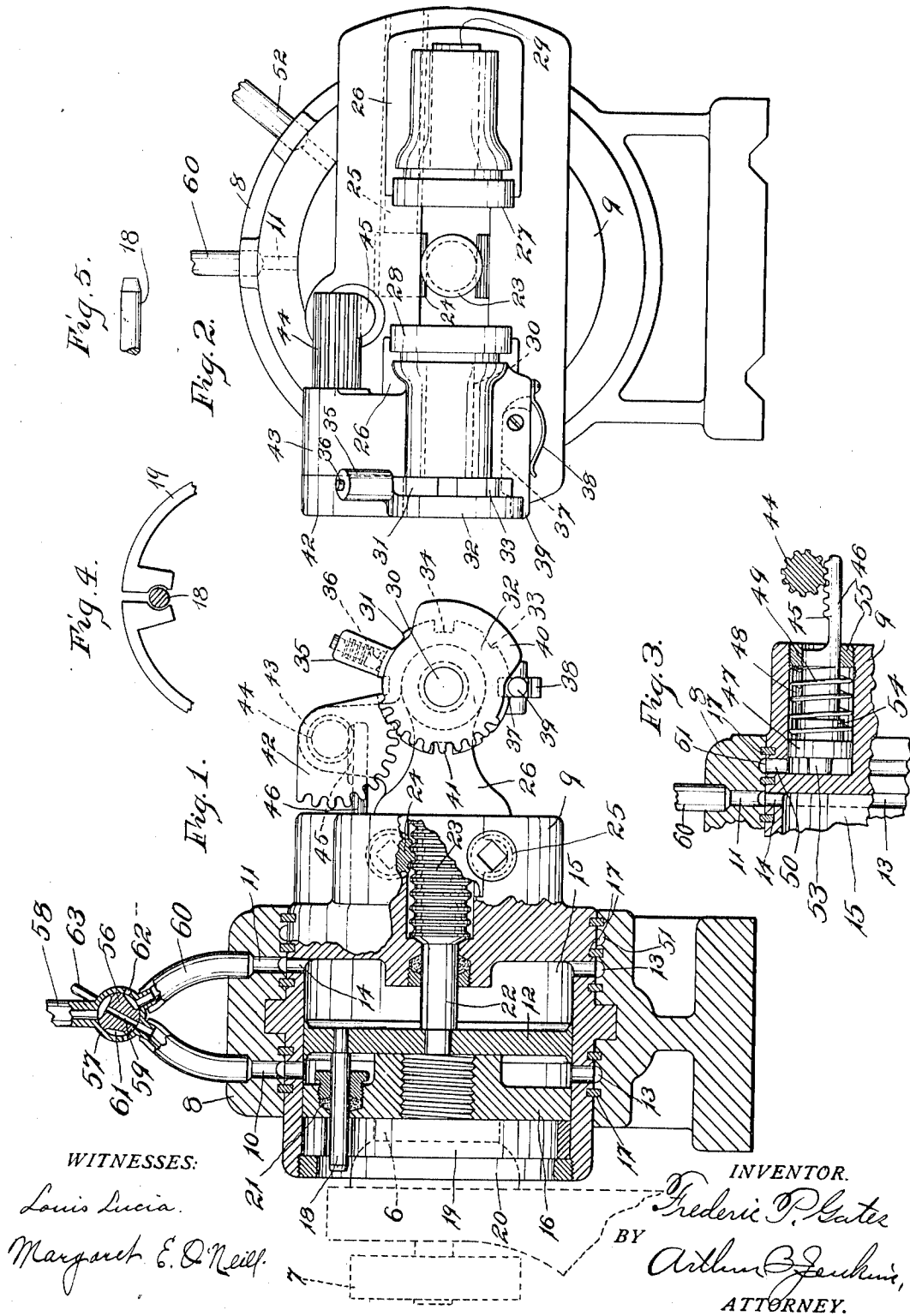


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CHUCK.

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WITNESSES:

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CHUCK.

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To all whom it may concern:

Be it known that I, FREDERIC P. GATES, a citizen of the United States, and a resident of Newington, in the county of Hartford and State of Connecticut, have invented a new and Improved Chuck, of which the following is a specification.

My invention relates to the class of devices used to grasp and support articles for the operation of tools thereon, and an object of the invention, among others, is to provide a device of this class that may be readily and quickly operated and that will effectually do the work for which it is intended.

One form of device embodying my invention and in the construction and use of which the objects above set out, as well as others that will appear from the following description, may be attained is illustrated in the accompanying drawings in which—

Figure 1 is a view partially in central vertical section through a chuck embodying my invention. Fig. 2 is an end view of the same. Fig. 3 is a detail view in section through a portion of the device on a plane passing diametrically through the indexing piston chamber. Fig. 4 is a detail view showing the meeting ends of the split ring engaged by the beveled pin. Fig. 5 is a detail view on enlarged scale showing the beveled pin.

In the accompanying drawings, the numeral 6 denotes the spindle of a lathe or similar machine having the usual driving pulley 7, and 8 denotes a case adapted to be supported on the frame of the lathe or like machine and within which a chuck-body 9 is located. This case acts to supply air to the chuck-body through ducts 10 and 11, each of which acts both as a supply and as an exhaust duct, the action as a supply or exhaust depending upon the direction of movement of a piston 12 located in the chuck-body. Any suitable means for conducting the air to and away from said ducts may be employed. Annular grooves 13 are located on the inner face of the opening in the case 8 and ports 14 extend through the walls of the case 8 into a chucking piston-chamber 15 located in the chuck-body 9. This chamber is closed by a plate 16 secured to the screw threaded end of the spindle 6, as shown in Fig. 1 of the drawings. The chuck-body is located in the opening in the

case, suitable packings, as 17, located in registering packing grooves in the inner face of the case and the outer surface of the chuck-body preventing the escape of air outward between these two parts. The piston 12 is located in the chamber 15, and a clutch-operating pin 18 secured to the piston projects through the plate 16, the outer end of this pin being beveled to engage between the free ends of a split clutch-ring 19 located within the chuck-body against the plate 16 and held in place as by means of a ring 20 screw threaded to fit the screw threaded inner surface of the chuck-body. A stuffing box 21 may be arranged in the plate 16 to prevent escape of air through the opening occupied by the pin 18.

A piston rod 22 secured to the piston passes through the walls of the chamber 15 and has a rack 23 formed on its outer end, and properly located to engage with pinions 24 on jaw-feed screws 25 mounted in the chuck body and meshing with feed threads on the sides of the chuck-jaw supports 26. The rack at 23 as herein shown is circular in cross section so that it may rotate with the plate 16 while in engagement with the pinions 24, the latter being rotated by the rack only in its reciprocating movement longitudinally. The supports 26 receive chuck jaws 27 and 28 mounted to rotate in the outer ends of the supports, said jaws having stems 29, 30 projecting within said supports which form the journal bearings for the jaws. The stem 30 has an index plate 31 secured to its outer end, and a cam plate 32, in the form herein shown, located against the index plate and mounted to turn freely upon the stem 30. The index plate contains indexing recesses 33 and locking recesses 34. A detent socket 35 projects from the edge of the cam plate 32, overlying the edge of the index plate 31. This socket contains a detent 36, spring pressed toward the indexing plate and projecting to engage the index recesses 33. A locking bolt 37 is pivotally mounted in the side of the chuck-jaw support bearing the chuck jaw 28, this locking bolt being located in position to engage the locking recesses 34, and being forced toward the index plate as by means of a spring 38. The end 39 of this bolt is formed for engagement with a cam 40 on the cam plate 32, in the form herein shown

the end of the bolt being round in cross section. The periphery of the cam plate is provided with teeth 41 extending for a portion of the distance around the plate and located preferably opposite the cam 40, these teeth meshing with the teeth of a segment 42 mounted in a bearing 43 on the opposite side of the chuck-jaw support from the locking bolt 37. A pinion 44 is rigidly secured to rotate with the segment 42, this pinion being of considerable length to permit movement of the chuck jaw 28 while the piston is retained in engagement with the teeth on an indexing rack 45 at the end of an indexing piston-rod 46 secured to an indexing piston 47 located within a piston chamber 48 in the chuck body. A spring 49 forces the piston in one direction and air supplied through the port 50 to the piston chamber forces the piston in the opposite direction. This port 50 communicates with an annular air channel 51 located on the inner face of the case 8, air being supplied to and exhausted from this channel from any suitable source as through the inlet pipe 52, by means as hereinafter described.

The chuck jaw supports 26, in the construction herein shown are formed to receive chuck jaws adapted for a special kind of work, but I contemplate the substitution of well known forms of chuck jaws in the place of the supports 26, and also the arrangement of these jaws in a manner well known in chuck construction in which frequently three jaws or other number are employed. The illustration and description of the connection between the rack 23 and the intermeshing pinions 24 on the chuck jaw feed screws, with the aid of ordinary mechanical skill will readily suggest the adaptation to chucks containing a greater or less number of chuck jaws.

The mechanism borne by the jaw supports 26 is intended for operation of the machine upon articles in which the action of the tools takes place upon different parts of the article, as a valve casing having for instance three openings to be screw threaded, and the operation of the machine upon such a piece is as follows: It being assumed that the piston 12 is at the opposite end of the chamber from that shown in Fig. 1, a valve body is placed between the jaws 27, 28 and air being admitted through the duct 11 forces the piston 12 to the position shown in Fig. 1. This movement of the piston imparts longitudinal movement to the piston rod 22 and the rack 23 thereon, this lengthwise movement of the rack rotating the pinions 24, the jaw-feed screws 25 thus closing the jaws together to tightly grip the valve body. This movement of the piston has also forced the pin 18 between the ends of the clutch ring 19 to expand the same whereby the chuck-body is connected

to rotate with the spindle 6, the rotation of which is communicated to the chuck body through the plate 16 carrying the clutch arm and the tool may perform the operation of cutting the thread in one of the openings in the valve body. When this operation is completed and the tool is withdrawn, admission of air through the port 50 will cause the piston 47 to be moved outward, rotating the segment 42 and the cam plate 32. It will be noted that the detent 36 will be permitted some movement before it engages the indexing recess, and this allows the cam 40 to act upon the end 39 of the locking bolt 37 and withdraw it from a locking recess before engagement of the detent with an indexing recess. This latter engagement then rotates the indexing plate 31 and the chuck jaws a quarter turn, presenting the next opening in the valve-body in line with the tool to cut the thread. When the parts have reached this position, the opening of the air channel 51 for exhaust through the pipe 52 as hereinafter described allows the spring 49 to return the piston 47 to its normal position, this movement returning the cam plate 32 to its position of rest and allowing the locking bolt 37 to enter a locking recess in the indexing plate 31 and thus hold the jaws while the tool is operated.

As a means for retaining the piston 47 so that air may enter behind it a lug 53 is provided and a stop 54 is located on the opposite side of the piston from said lug. This stop in connection with the adjustable ring 55 determines the amount of movement of the piston to rotate the indexing mechanism to the proper degree to permit the locking bolt 37 to enter a locking socket.

Any means for admitting air to the chucking piston chamber 15 may be employed, a convenient means being that shown herein, in which a valve 56 located in a valve casing 57 is employed. An inlet passage 59 extends through the valve in position to communicate with the inlet pipe 58 and either of the delivery pipes 60 as clearly shown in Fig. 1 of the drawings. Exhaust passages 61 are located in the surface of the valve and are adapted to communicate with exhaust outlets 62 through the valve casing as plainly shown in Fig. 1 and from which the operation of the valve, as by means of the handle 63, will be readily understood. Similar means, the valve and casing being arranged to suit the case, may be employed for admitting air through the inlet pipe 52.

While I have shown and described herein one form of mechanism for carrying out my invention other forms of structure may be employed to serve desired ends and yet embody the invention, and I do not therefore limit my invention as set forth in the appended claims to a mechanism constructed

in exact accordance with that herein illustrated and described.

While I have shown and described a piston secured to the spindle and serving as a means for reciprocating the rack 23 to operate the jaw feed screws, I contemplate other means for imparting this reciprocating movement to said feed rack, and I wish it to be distinctly understood that any other means for accomplishing said movement will be within the spirit and intent of the invention as set forth in the appended claims.

I claim—

1. A chuck body having a piston chamber located therein, means for supplying air to said chamber to control the movements of a piston, the piston located within said chamber, clamping members located on the chuck body, feed screws for said clamping members, a rack secured to the piston and in engagement with said feed screws, a plate adapted to be secured to a spindle and forming one wall of the chamber in the chuck, and means for securing the chuck body to rotate with said plate.

2. A chuck body having a piston chamber, means for supplying air to said chamber to control the movements of a piston, the piston located within said chamber, clamp devices mounted on the chuck body, feed screws to operate said clamp devices, a rack secured to the piston and connected with the feed screws to rotate independently thereof, a plate forming one wall of the chamber in the chuck body and adapted to be secured to a spindle, a clutch ring, and means for operating the ring to connect the chuck body and plate.

3. A chuck body having a piston chamber located therein, means for supplying air to said chamber to control the movements of a piston, the piston located in said chamber and adapted to rotate therein, a feed rack secured to said piston, feed screws operatively connected with said rack, clamp devices operated by said feed screws, a plate adapted to be secured to a spindle and forming one wall of the chamber in the chuck body, a clutch operating pin secured to the piston, and a clutch ring mounted for operation by said pin and adapted to clutch said plate and chuck body together.

4. A casing, a chuck body to rotate in said casing and having a chamber, air passages located at the meeting surfaces between the casing and chuck body for a flow of air to control the movements of a piston, the piston located in said chamber, a rack secured to said piston, feed screws operatively connected with said rack, clamp devices operatively connected with the feed screws, a plate forming one wall of the chamber in the chuck body, and means controlled by the movement of the piston to connect the chuck body and plate to rotate together.

5. A casing, a chuck body projecting through the casing and having a chamber, air passages located at the meeting surfaces of the chuck body and casing for flow of air to control the movements of a piston, the piston located in said chamber, a feed rack secured to said piston, feed screws connected with said feed rack, clamp devices connected to be operated by said feed screws, a plate forming one wall of the chamber in the chuck body and adapted to be secured to a spindle, a clamp ring, and a pin secured to the piston and engaging said clamp ring to clutch and unclutch the chuck body and plate.

6. A chuck body having a chamber therein, means for supplying air to said chamber to control the movements of a piston, the piston located in said chamber, a rack secured to said piston, feed screws connected with said rack, clamp devices connected to be operated by said feed screws, a plate adapted to be secured to a spindle and mounted to rotate in said chuck body, a retaining ring secured to the chuck body, a clamp ring secured between the retaining ring and said plate, and a pin projecting from the piston through said plate in position to operate said clamp ring.

7. A chuck body having a chamber therein, means for supplying air to said chamber to control the movements of a piston, the piston located in said chamber, a plate forming one wall of said chamber and adapted to be secured to a spindle, means for connecting the plate and chuck body to rotate together, a circular rack secured to the piston, feed screws having pinions engaging said rack, clamp devices mounted on the chuck body and movable radially thereof, and connections between said clamp devices and feed screws for operation of the former.

8. A casing, a chuck body extending through the casing and mounted therein and having a chamber, means for supplying air to said casing to control the movements of a piston, the piston located in said chamber, a plate adapted to be secured to a spindle and forming one wall of said chamber, a clamp ring, a pin secured to the piston and projecting to operate said clamp ring, a rod secured to the piston and projecting through the wall of said chamber, a circular rack secured to said rod, feed screws having pinions located on opposite sides of said rack, clamp devices mounted on the chuck body and movable radially thereof, and connections between the clamp devices and feed screws for operation of the former.

9. A chuck body having a piston chamber, a piston located in said chamber, means for supplying air to control the movements of said piston, clamp devices, connections between said clamp devices and piston for operation of the former, chuck jaws

mounted on said clamp devices, means for rotating said chuck jaws, means for locking said jaws against movement, an indexing piston chamber located in said chuck body, an indexing piston located in said chamber, means for supplying air to operate said piston, and connections between said piston and chuck jaw rotating means.

10. A chuck body having a main piston chamber and an indexing piston chamber, a main piston located in its chamber, means for rotating the chuck body, means for supplying air to said chamber to control the movement of the main piston, a clamp device, connections between the clamp device and main piston to operate the former, chuck jaws mounted on the clamp device, means for rotating the chuck jaws a predetermined distance, means for locking them against rotation, an indexing piston located in the indexing piston chamber, means for supplying air to control the movement of said piston, and connections between said piston and indexing and locking means for operating said indexing and locking means.

11. A chuck body, means for rotating the chuck body, supports mounted on said chuck body, means for moving said supports toward and from each other, chuck jaws rotatably mounted in the supports, an indexing piston located in the chuck body, means for supplying air to control the movement of said piston, a rack secured to the piston, a pinion slidably engaged with said rack and carried by one of said supports and connections between said piston and chuck jaws for rotation of the latter.

12. A chuck body means for rotating the chuck body, supports mounted on said chuck body, means for moving the supports toward and from each other, chuck jaws rotatably mounted in the supports, an indexing mechanism for said jaws, a locking

mechanism for said jaws, an indexing piston mounted in the chuck body, means for supplying air to control the movement of said piston, a rack secured to the piston, a pinion slidably engaged with said rack, a toothed member secured to said pinion, a toothed member engaged therewith, and connections between the last mentioned toothed member and the indexing and locking mechanism to operate the latter.

13. A chuck body, means for rotating the chuck body, supports mounted upon the body, means for moving the supports toward and from each other in the line of the axis of rotation of the chuck jaws, chuck jaws mounted to rotate on said supports, an indexing plate mounted on one of the jaws, a cam plate mounted on one of said jaws and having a detent to engage the indexing plate, a locking bolt for the indexing plate and operated by the cam plate, an indexing piston mounted in the chuck body, and connections between said piston and said cam plate for operating the latter.

14. A chuck body, means for rotating the chuck body, supports mounted on the chuck body, means for moving the supports toward and from each other, chuck jaws rotatably mounted in said supports, an indexing plate having locking sockets and indexing recesses, a locking bolt to engage said sockets, a cam plate secured to one of said jaws, a detent to engage said indexing recesses, a rack located on the edge of the cam plate, a rack intermeshing therewith, a pinion secured to the last mentioned rack, an indexing piston operatively connected with said pinion and means for supplying air to control the movement of said piston.

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Witnesses:

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