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J. MORRISON.

MEANS FOR OPERATING CHUCKS.

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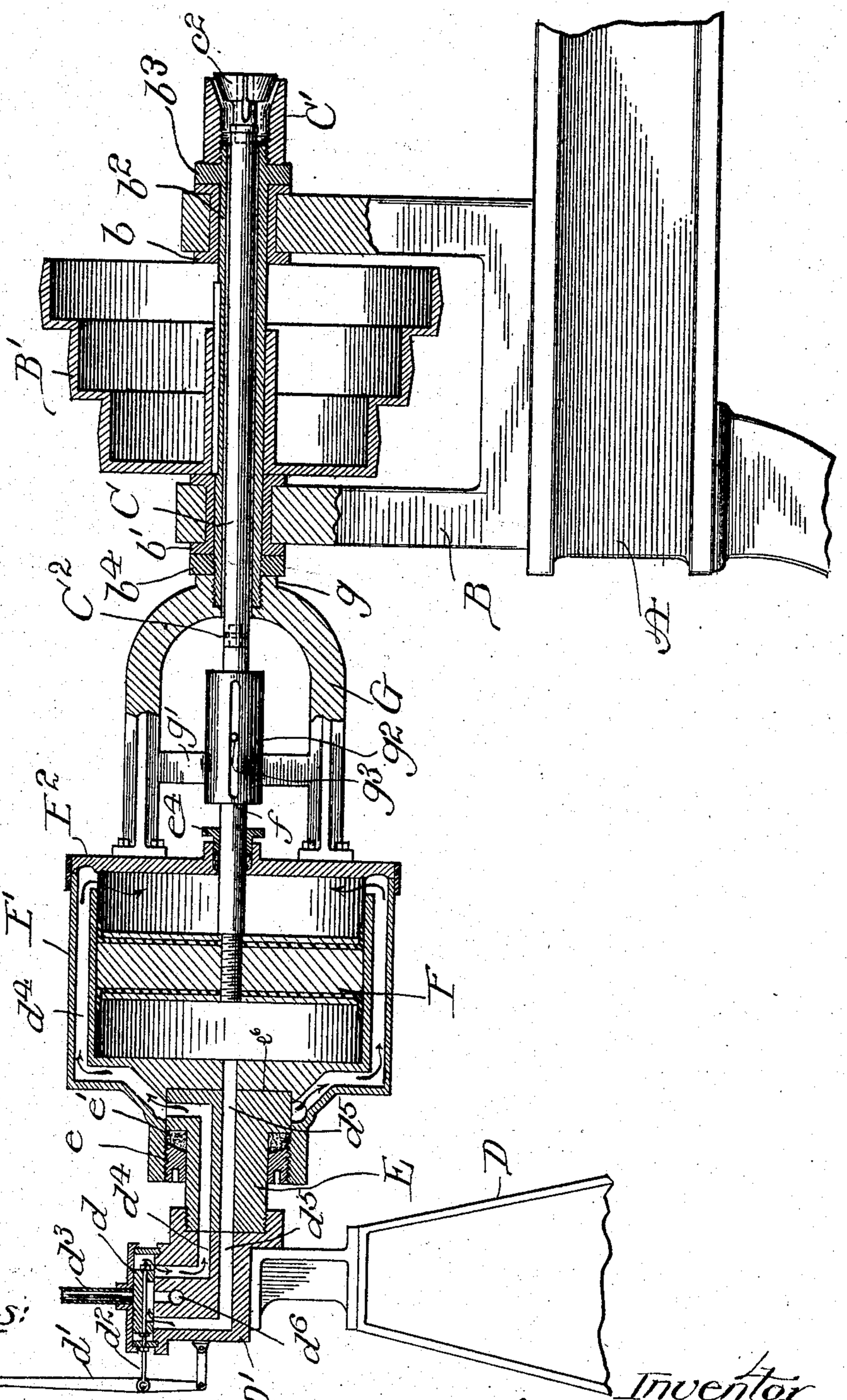

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MEANS FOR OPERATING CHUCKS.

No. 806,168. Specification of Letters Patent. Patented Dec. 5, 1905.

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To all whom it may concern:

Be it known that I, JOHN MORRISON, a citizen of the United States, and a resident of Dubuque, Dubuque county, Iowa, have invented certain new and useful Improvements in Means for Operating Chucks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in pneumatic chucks, and for convenience is shown more particularly in relation with a turning-lathe provided with a draw-chuck.

Heretofore draw-chucks have frequently been employed, and various devices have been used to operate the same. Usually direct-acting levers have been employed for the purpose.

The object of this invention is to provide a positive pneumatically-operated means for actuating the chuck, whereby the same acts to hold the article engaged therein rigidly in place, thereby adapting it for quick engagement and quick release.

The invention consists of the matters hereinafter described, and more fully pointed out and defined in the appended claims.

The drawing represents a longitudinal fragmentary section of a head-stock of a lathe provided with a device embodying my invention for actuating the chuck.

As shown in said drawing, A indicates the lathe-bed; B, the head-stock, provided in the usual manner with uprights or standards at each end, in which is journaled in suitable boxes b b' the tubular shaft b^2. Said shaft b^2 is provided on its inner end with a collar b^3, adapted to engage against the bearing on the inner side of the head-stock, and the extremity of the shaft is threaded in the usual manner to receive the chuck-socket C′ or other attachment adapted to be secured thereon. At its outer end said shaft is screw-threaded and is provided with a collar b^4, engaged thereon, which bears against the outer end of the box b' and acts, together with the collar or flange b^3, to take up the end motion of the shaft. Extending through said tubular shaft b^2 and fitting loosely therein is the chuck-shaft C, which may also be tubular and which at its inner end carries the chuck c^2, which is shown as a familiar type of draw-chuck. At its rear end said shaft is threaded to receive a nut. A cone-pulley B′ is secured on the shaft b^2 in any suitable manner for actuating the chuck.

D indicates an upright or standard at the rear end of the lathe and in alinement therewith, upon which is supported the operating-valve, which comprises, as shown, the casing D′, rigidly secured at the top of said standard D and faced on one side (as shown the upper side) to receive a slide-valve closure d, which is inclosed in a fluid-pressure chamber at the top of said casing D′. A lever d' is positively engaged with the slide-valve closure by means of a rod d^2 and is adapted to actuate said valve-closure to either of its adjusted positions. An inlet-pipe d^3 opens into said chamber, and passages d^4 and d^5 lead from said slide-valve closure inwardly through the casing D′. The inlet ends of said passages are so positioned that when said valve is at one limit of its movement the fluid from the inlet-pipe passes through one of said ports—as, for instance, d^4—and exhausts through the other, d^5, into an exhaust-passage (indicated by d^6) the port of which is located centrally beneath the slide-valve-closure. When the closure is at the other limit of its movement, the flow is reversed through said passages, the fluid passing inwardly through the passage d^5 and exhausting through the passage d^4. Said valve casing or body D′ is provided in its side, in axial alinement with the arbor or shaft of the lathe, with a screw-threaded aperture through which said passages d^4 d^5 open. Having screw-threaded engagement in said aperture in the casing is an extension E, provided with passages registering with the passages d^4 d^5 in the casing or valve-body. A circular head is provided on said extension at its end adjacent the lathe, which, as shown, fits into a cylindric axial recess e^6 in the head of a pneumatic cylinder E′. Said cylinder, as shown, is cast or otherwise formed with an integral head, (as shown, that adjacent the valve,) in which is provided said recess e^6. The cylinder is adapted to rotate on the enlarged end or head of said extension E, and said bore or recess is provided near its outer end with internal screw-thread adapted to receive the follower e, which fits closely to said extension and between which and the head of the same is provided a packing e' of any desired kind, thus enabling the cylinder to turn on said extension, while affording a satisfactory packing therefor.

The passage d^4 of the valve-body is continuous with a like passage through said ex-

tension and through and along the walls of the cylinder E′ to the opposite end of the cylinder, where said passage opens through one or more ports into the cylinder. The passage d^5 is also continued through the extension and opens into the adjacent end of said cylinder. A head E^2 is rigidly bolted or otherwise rigidly secured in place on the otherwise-open end of said cylinder and is provided centrally with a stuffing-box e^4, through which extends the piston-rod f, positively connected with the piston-head F within said cylinder. Said piston-head is provided on each side thereof with any suitable piston-packing. Rigidly secured on the head E^2 of said cylinder is a yoke G, the arms of which are rigidly bolted to said head and are integrally connected adjacent the lathe and provided with a screw-threaded aperture adapted to receive the screw-threaded end of the shaft or lathe-arbor b^2. Connecting said arms of said yoke intermediate the cylinder and the lathe is a transverse bar g', provided centrally with an enlarged hub g^2, through which the piston-rod f passes and is slidably but non-rotatably engaged therein by means of a pin g^3, which engages in said piston-rod and the outer end of which is seated in a longitudinal slot in said hub. The outer end of said piston-rod affords a joint with and is positively engaged on the chuck-shaft C by means of the cotter-pin C^2, which passes through said joint in said shaft and piston-rod.

The operation is as follows: When it is desired to secure an article in the chuck c^2, the lever d' is adjusted to slide the valve d into position to open the port for the passage d^5, thereby forcing the piston-head inwardly and the shaft C longitudinally of the head-stock and permitting the chuck to open to receive that to be secured therein. The lever d' is then reversed, sliding the valve-closure to its opposite adjustment and connecting the port d^5 with the exhaust-passage and opening the passage d^4, which communicates with the opposite end of the cylinder, as shown in the drawing. The air-pressure is thus admitted into the opposite end of the cylinder or that adjacent the lathe, forcing the piston outwardly and drawing the jaws of the chuck into positive engagement with the surrounding chuck-socket C′, thus closing the chuck upon any article held therein.

Inasmuch as the cylinder and yoke are rigidly secured upon the lathe, spindle, or arbor, it is obvious that said cylinder, with its piston, revolves with said shaft and the pulley B′.

Obviously the mechanism constructed as described can be used equally well with chucks adapted to be closed by forcing the shaft inwardly toward the work. When such a chuck is used, pressure is applied through the passage d^5 at the other end of the cylinder, forcing said piston inwardly. Inasmuch as the fluid when used for this purpose affords a cushion, chucks operated thereby, though held very positively, afford considerable resiliency to avoid breaking the chuck.

While I have shown my invention in connection with a lathe, it is obvious that the same may be employed as well with drill-presses and other machines in which it is desired to adjust a tool into engagement with and remove the same from a chuck very quickly, and it may be applied to great advantage to any of the high-speed tools now in use.

Obviously, while I have described the specific construction illustrated in the drawing any fluid may be used, the cylinder may be differently positioned and operated, and many details of construction may be varied without departing from the principles of this invention.

I claim as my invention—

1. In a device of the class described the combination with a rotative chuck-shaft, of a cylinder rotative therewith, a piston-head in said cylinder and engaged on said shaft, a valve-casing in axial alinement with said cylinder, an extension thereon forming a bearing for the inner end of the cylinder and a valve-closure in said casing.

2. A fluid-operated chuck comprising a tubular arbor, a chuck-shaft longitudinally movable therein, a cylinder, a piston therein adapted to operate the shaft, a valve-casing, an extension thereon in axial alinement with said cylinder, and forming a bearing for one end of the shaft, said extension affording passages opening both into said casing and said cylinder.

3. In a device of the class described, the combination with a chuck-shaft, of a piston rigidly engaged on one end thereof, a cylinder inclosing said piston, a valve-casing provided with ports therethrough, an extension thereon bored to form a continuation of the ports in said casing and providing a bearing for one end of said cylinder and a valve-closure in said casing controlling said ports.

4. In a device of the class described, the combination with a rotative cylinder having a piston therein, of a chuck-shaft rigidly engaged on said piston, a valve-casing, a valve therein adapted to control the ports in said cylinder and an extension on said casing seated in the end of said cylinder and affording a bearing therefor.

5. A combination with a cylinder, of a piston therein, an outwardly-extending piston-rod, a slidable chuck-shaft in operative connection with the piston-rod, a valve-casing, a part thereon affording a bearing upon which the cylinder rotates and operating means adapted to admit fluid-pressure into either end of the cylinder through said bearing and to move the chuck-shaft in either direction.

6. In a device of the class described the combination with a tubular arbor of a chuck-shaft

slidably engaged therein, a cylinder, a piston therein operatively connected with said shaft, a standard, a valve-casing rigidly engaged thereon and an extension on said valve-casing opening into said cylinder and affording a bearing therefor.

7. In a device of the class described the combination with a standard, of a valve-casing thereon, a valve in said casing, a laterally-directed extension on said valve-casing provided with ports leading therefrom, a cylinder journaled on said extension, a piston therein, a hollow spindle to which the cylinder is secured and a chuck-operating shaft therein operatively connected with said piston.

8. In a device of the class described, the combination with a head-stock and a standard, of a tubular arbor journaled in said head-stock, a chuck-shaft slidably engaged therein, a rotative cylinder secured to the tubular arbor, a piston operatively connected with said chuck-shaft, a valve and casing carried on said standard and an extension from the casing in axial alinement with said arbor affording a bearing for said cylinder and having ports communicating with the cylinder and controlled by the valve.

9. In a fluid-operated chuck, a rotative tubular arbor, a cylinder rigidly engaged thereon, a piston in said cylinder, a chuck-operating shaft connected with said piston and slidably engaged in said arbor, a valve-casing, an extension thereon affording a bearing for one end of said cylinder and provided with passages communicating with the ports in said casing and with the cylinder at each end of the piston and a valve controlling said passages.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

JOHN MORRISON.

Witnesses:
C. W. HILLS,
W. W. WITHENBURY.