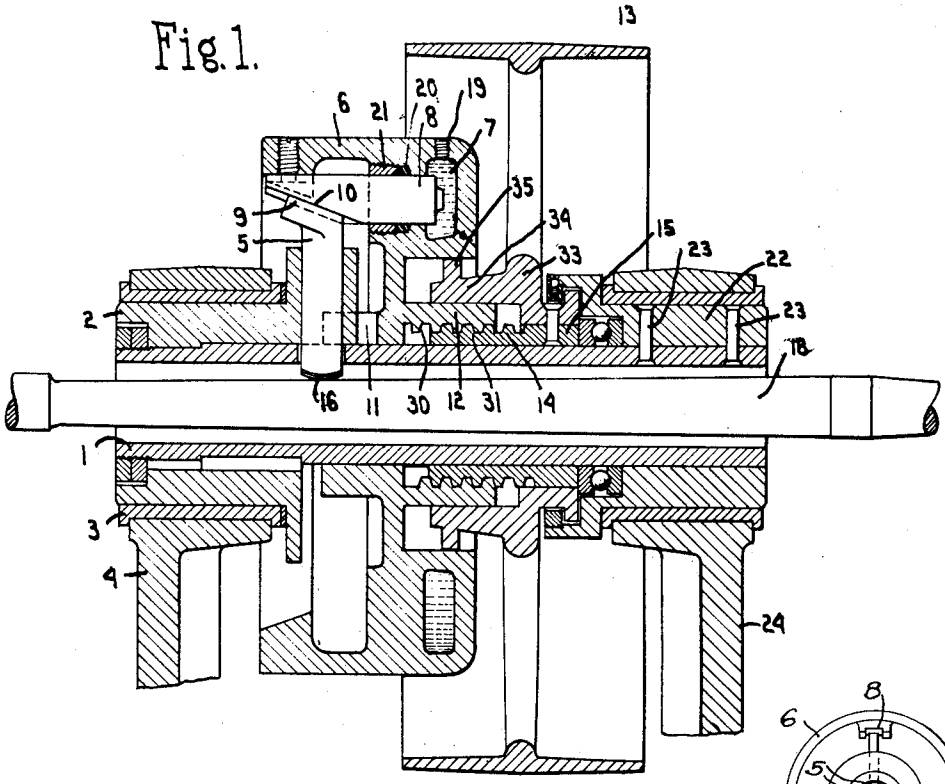
July 28, 1931. F. H. RAGAN 1,816,655

CHUCKING MECHANISM

Filed March 1, 1926

Fig.1.



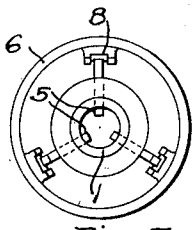


Fig.3.

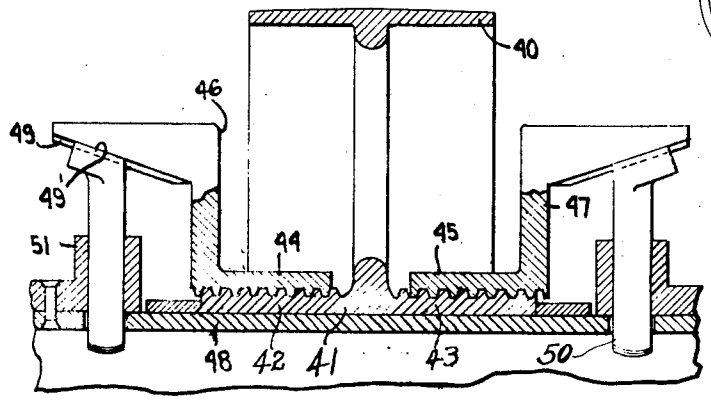


Fig.2.

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UNITED STATES PATENT OFFICE

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CHUCKING MECHANISM

Application filed March 1, 1926. Serial No. 91,368.

The present invention, relating, as indicated, to chucking mechanism is particularly directed to the provision of improved apparatus for chucking irregular pieces, that is, members having uneven or varying dimentions. A further object of the invention is the provision of apparatus which shall be self-locking upon the beginning of rotation of the chuck as a whole and which shall automatically unlock upon the cessation of rotation. A still further object of the invention is the provision of means for equalizing the pressure exerted upon the stock by the various jaws or engaging elements of the apparatus. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings:

Fig. 1 is a transverse longitudinal section through one form of my improved mechanism; Fig. 2 is a similar view more or less diagrammatic illustrating a modification of the invention, and Fig. 3 is a diagrammatic end view of the chuck, body and jaws.

Referring now to Fig. 1 the apparatus is shown to consist of a hollow tubular stock receiving member 1, upon which are secured cylindrical elements 2 and 22, each of which is rotatably mounted in a suitable support 4 or 24, which constitute the frame of the machine. Slidably disposed in suitable radially disposed openings in the member or head 2 are stock-engaging elements or jaws 5, which are provided at their outer ends with portions 9 inclined at an angle to the axis of the jaws 5 and provided with a dovetailed groove engaging over a corresponding projection on the inclined outer surfaces of actuating elements 8. The engagement between the actuating elements 8 and the jaws 5 is such that upon longitudinal movement of the elements in a direction parallel to the axis of the entire chucking apparatus corresponding radial movement is imparted to the jaws 5, the jaws 5 being forced radially inward or pulled radially outward, depending upon the direction of movement of the actuating elements. The actuating elements are slidably mounted within a head or cylindrical turret 6, which is in turn rotatably mounted upon the tubular member 1 and is provided with an internal thread 30 upon a longitudinally extending flange 12 which engages with a corresponding threaded portion 31 on a sleeve 14, which is rotatably mounted upon the tubular member 1 and is secured to the central hub 33 of a rotatable driving element, which is here shown in the form of a pulley 13. The hub 33 of this driving element is provided with a longitudinally extending sleeve 34 slidably and rotatably bearing against the outer surface of the flange 12 of the head 6, and having a projecting circular rim 35 which is in slidable and rotatable engagement with the inner longitudinally projecting rear portion of the head 6.

It will be obvious from the description to this point that rotation of the head 6 and of the member 2, which is engaged by projecting arms 11 extending from the inner portion of the head 6 and into suitable recesses in the member 2, will also produce rotation of the jaws 5 which are carried in the member 2. Radial movement of the jaws 5 is produced by longitudinal movement of the head 6 in the following manner. The free ends of the actuating elements 8 project into an annular chamber 7 formed in the head 6, which is filled with fluid or with material which is capable of bodily movement equivalent to the plastic flow of a fluid, such for example as fine shot or the like. Longitudinal movement of the head 6 will cause corresponding movement of the actuating elements 8 through the medium of the fluid in the chamber 7, but upon engagement of any one of the radial arms 5 with the stock 18 further movement of this jaw is restrained and the pressure exerted through the other jaws on the stock is equalized through the fluid contained in the

chamber 7, which is the intermediate agent between the member 6 and the actuating elements 8. In this way the movement and engagement of the various jaws 5 is automatically adjusted to the same pressure on each of the various jaws, regardless of the contour of the stock 18.

The operation of the head 6 and of the train of mechanism just described is produced by rotation of the driving element or pulley 13. Upon the initial rotation of this pulley when the machine is set in motion the thread 31, at the inner hub of the pulley, screws the thread 30, carried on the member 6 longitudinally away from the pulley. This action occurs upon the initial rotation of the pulley and this longitudinal movement of the member 6 produces the movement of the actuating elements 8, and therethrough the radial movement of the engaging members 5. When the power is shut off, however, the pulley 13 will first come to rest, due to the friction of the train of driving elements between it and the source of power, while the momentum of the head and the parts rotating with it is sufficient to continue the rotation of this member beyond that of the pulley, with the result that the head will thread its head back toward the center of the pulley, thus releasing the pressure of the actuating elements 8 and causing the latter to be retarded, in this way withdrawing the radial jaws 5 from engagement with the stock.

It will be readily understood that the present mechanism may be employed in chucking regular objects in which there is substantially no variation in the dimensions without any means for equalizing or adjusting the pressures and movements of the individual engaging jaws, and in this event the fluid equalizing means may be omitted and the movement of the head 6 may be employed directly to actuate the engaging elements 5 either through a direct engagement with the beveled ends of these members or through one or more actuating elements, such as the elements 8 which are here shown. It will also be understood that the elements 8 act in the present construction as pistons, and these elements are sealed against any leakage from the chamber 7 by means of packing 20 and packing nuts 21. It should be understood that the liquid contained in the head 6 operates merely as a cushion connection between head 6 and the pistons 8. Its prime function is to effect equalization of pressure on these pistons.

In Fig. 2 I have shown a modification of the invention in which a rotatable driving element, in the form of a pulley 40, is provided with a hub 41 which has right and left-hand screws 42 and 43 engaging respectively corresponding threaded portions 44 and 45 on cylindrical members 46 and 47, respectively. These members 46 and 47 are mounted upon a tubular housing 48, within which the stock is received. Each of the members 46 and 47 is provided with a beveled engaging surface 49 engaging upon a corresponding surface 49′ on a series of radial jaws 50, slidably mounted in heads 51 which are keyed to the tubular member 48. Upon the initial rotation of the pulley 40 the two members 46 and 47 are forced outwardly along the tubular member 48 through the right and left threading between the hub 41 and the sleves 44 and 45. This action produces a radially inward movement of the jaws 50, and upon the engagement of one set of jaws further outward movement of its actuating member ceases, after which the pulley 40 floats toward the other actuating member until it in turn has caused its jaws to engage the stock, whereupon the pulley remains in its then position, rotating the two members 46 and 47 and through them the heads 51 and the engaged jaws.

The present apparatus affords a simple and automatically engaging and adjusting chucking mechanism for use either on uniform or non-uniform stock and one which is quicker in operation that those now in general use.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In apparatus of the character described, the combination with a rotatable chuck of radially movable engaging jaws carried thereby, an actuating element for said jaws, a rotatable driving member for said chuck, and means operable upon rotation of said rotatable member for effecting operation of said actuating elements.

2. In apparatus of the character described, the combination with a rotatable chuck of radially movable engaging jaws carried thereby, an actuating element therefor, a rotatable driving member for said chuck, and means interposed between said rotatable member and said actuating element, said means being operable upon the initial rotation of said driving member to operate said actuating element.

3. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, a longitudinally movable actuating element therefor, a rotatable driving member, and means interposed between said rotatable member and said actuating element, said means being operable upon the initial rotation of said

rotatable member to engage and operate said actuating element.

4. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, an actuating element for each of said jaws, and means operable upon rotation of said rotatable member for operating said actuating elements.

5. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, an actuating element for each of said jaws, a rotatable member, means operable upon rotation of said rotatable member for operating said actuating elements, regulating pressure means interposed between said first-named means and said actuating elements, said pressure means acting to equalize the pressure exerted upon said jaws.

6. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, an actuating element for each of said jaws, means operable upon rotation of said rotatable member for operating said actuating elements, and fluid pressure means interposed between said first-named means and said actuating elements, said fluid pressure means acting to equalize the pressure exerted upon said jaws.

7. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, individual actuating pistons for each of said jaws, means for operating said pistons and fluid pressure means for equalizing the pressure applied to each piston.

8. In apparatus of the character described, the combination of a rotatable head, radially movable jaws therein, individual actuating pistons for each of said jaws, fluid pressure means for equalizing the pressure applied to said pistons, and means operable by said rotatable member for actuating said pistons upon the initial rotation of said member.

9. In apparatus of the character described, the combination of a series of radially arranged and radially movable engaging jaws, individual actuating elements therefor, a rotatable driving member, and means including fluid pressure means effective by rotation of said member to apply pressure to said actuating elements.

10. In apparatus of the character described, the combination of a rotatable chuck head provided with a sealed chamber, radially movable jaws in said chuck head, individual actuating pistons for said jaws extending in said chamber, and means for applying fluid pressure to said pistons in said chamber to actuate said jaws.

11. In apparatus of the character described, the combination of a rotatable chuck head, radially movable jaws mounted therein, a cylindrical member mounted concentrically on said chuck head, said member having an interior chamber containing a fluid, pistons extending into the interior of said hollow members and engaging said jaws, and means for bodily moving said hollow member longitudinally of said chuck head, whereby said pistons are actuated by fluid pressure to move said jaws.

12. In apparatus of the character described, the combination of a rotatable chuck head, radially movable jaws mounted therein, a cylindrical member mounted concentrically on said chuck head and being movable longitudinally but not rotatably thereof, and said member having an annular liquid containing chamber, pistons extending into said chamber, said pistons being disposed longitudinally of said chuck head and engaging said jaws, and means for longitudinally moving said cylindrical member to cause the liquid in said chamber to apply pressure to said pistons and said jaws to be actuated thereby.

13. In apparatus of the character described, the combination of a rotatable chuck head, radially movable jaws mounted therein, a cylindrical member mounted concentrically on said chuck head and being movable longitudinally but not rotatably thereof, and said member having an annular liquid containing chamber, pistons extending into said chamber, said pistons being disposed longitudinally of said chuck head and engaging said jaws, and means including a rotatable driving element and a threaded connection between the same and said cylindrical member for first moving said member longitudinally in said chuck head and then rotating the same with said chuck head.

14. In apparatus of the character described, the combination of a rotatable chuck head, radially movable jaws mounted therein, operating elements for said jaws, a driving element rotatably mounted on said chuck head, and connections between said driving element and chuck head and operating elements, said connections being constructed to initially produce radial movement of said jaws and then rotation of said chuck head.

15. In apparatus of the character described, the combination of a rotatable chuck head, radially movable jaws mounted therein, a pulley rotatably mounted on said chuck head, and an inner member interposed between said jaws and said pulley, and connections between said member and said pulley causing longitudinal movement of said member upon rotation of said pulley to actuate said jaws and then rotate said chuck head.

16. In a chuck, the combination of a cyl-

inder, jaws radially movable therein, a driving pulley for said cylinder normally rotatable thereon, and means actuated by the initial rotation of said pulley together with its own inertia for actuating said jaws and then rotating said cylinder.

17. In a chuck, the combination of a cylinder, jaws radially movable therein, a driving pulley for said cylinder normally rotatable thereon, means actuated by the initial rotation of said pulley together with its own inertia, and hydraulic equalizing means operated by said first named means and adapted to operate said jaws.

18. In a chuck, the combination of a cylinder, jaws radially movable therein, a driving pulley for said cylinder normally rotatable thereon, and equalizing means operated by the initial rotation of said pulley to apply equal actuating pressures to said jaws.

19. In a chuck, the combination of a cylinder, jaws radially movable therein, a driving pulley for said cylinder normally rotatable thereon, an actuating element for said jaws mounted for longitudinal movement on said cylinder, said element having a threaded flange, and a threaded flange on said pulley engaged with said first-named flange whereby rotation of said pulley causes longitudinal movement of said actuating element to operate said jaws.

20. In a chuck, the combination of a cylinder, jaws radially movable therein, a driving pulley for said cylinder normally rotatable thereon, and fluid pressure means operable by the initial rotation of said pulley for simultaneously actuating said jaws.

21. In a chuck, the combination of a cylinder, jaws radially movable therein, a rotatable driving member for said cylinder, and means operable by its own inertia upon the slowing down of said driving member for radially moving said jaws in a releasing direction.

Signed by me this 26th day of February, 1926.

FREDERICK H. RAGAN.