I. L. COLE.

UNIVERSALLY ADJUSTABLE WORK OR TOOL HOLDER.

APPLICATION FILED APR. 23, 1921.

1,399,194. **Patented Dec. 6, 1921.**

Fig. 1.

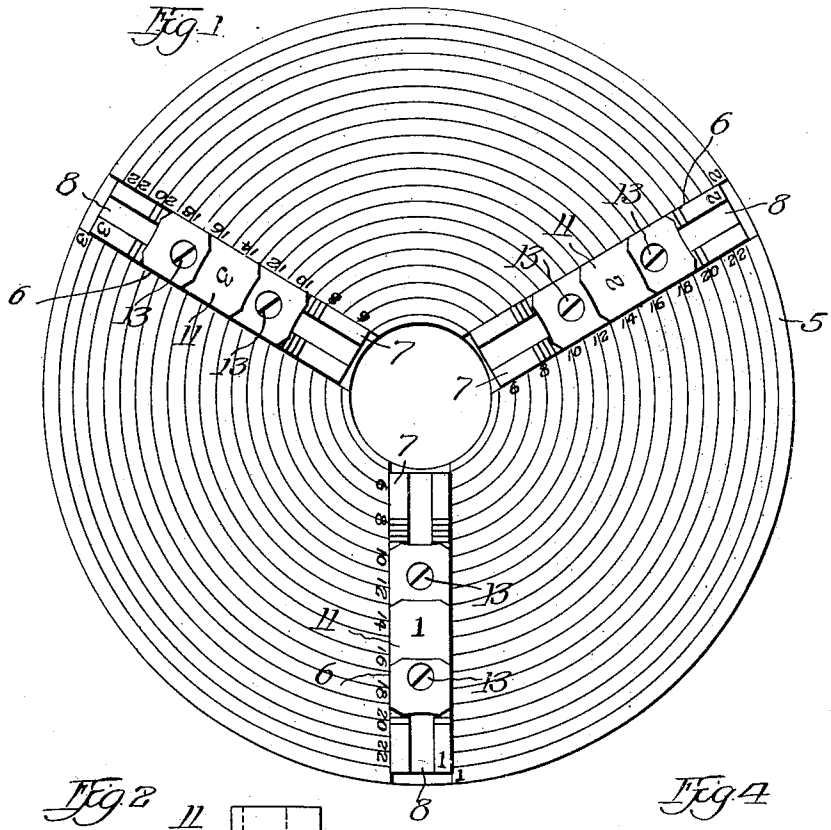


Fig. 2.

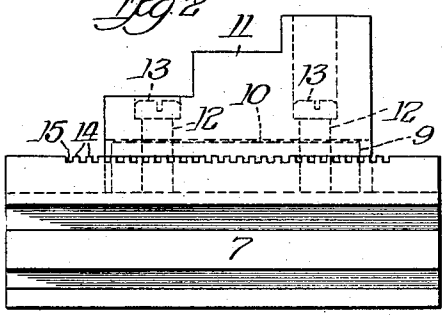


Fig. 3.

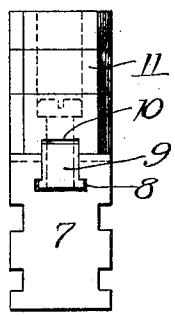
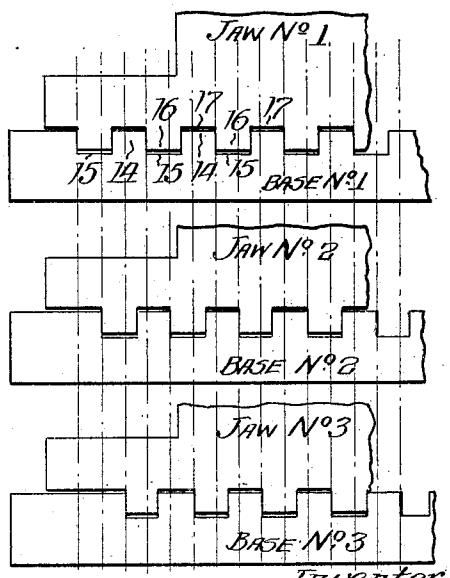


Fig. 4.



Witness:

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UNITED STATES PATENT OFFICE.

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UNIVERSALLY-ADJUSTABLE WORK OR TOOL HOLDER.

1,399,194. Specification of Letters Patent. Patented Dec. 6, 1921.

Application filed April 23, 1921. Serial No. 463,862.

To all whom it may concern:

Be it known that I, IRA L. COLE, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Universally-Adjustable Work or Tool Holders, of which the following is a specification.

This invention relates to an improved work or tool holding device designed to secure universal movement and unrestricted range of a plurality of radially adjustable work or tool holding members which are mounted on bases or carriers having a limited range of movement; and the invention has been designed chiefly for use in that type of chucks equipped with jaws having a comparatively restricted range of movement in gripping and releasing the work.

The main object of the invention is to provide a construction of chuck head and jaws of such a character and structure that the jaws may always be set to positions wherein they will lie within the limited range of action of the immediate jaw actuating devices which, in most cases, consist of elbow levers pneumatically actuated, the short arm of said levers being engaged with the jaw bases and usually possessing a range of movement of a small fraction of an inch.

In order that the invention may be readily understood, together with the manner in which the same is practised, I have illustrated the same in a typical embodiment in the accompanying drawing, in which—

Figure 1 is a front face view of a chuck head formed with three radial grooves to receive a corresponding number of jaws;

Fig. 2 is a side elevation of a jaw base, jaw mounted thereon and jaw clamping and adjusting means embodying my invention;

Fig. 3 is an end elevation of Fig. 2 as viewed from the left of the latter figure; and

Fig. 4 is a developed view of the three jaws and jaw bases, illustrating the differential relation of the coöperating teeth thereon.

Referring to the drawing, 5 designates a chuck head in which are formed three radial grooves or slideways 6 in which are mounted in the usual manner a corresponding number of jaw bases 7. Each of these jaw bases has formed on its upper side a longitudinal undercut groove or channel 8 in which is slidably fitted a jaw clamp 9, the upper portion of said clamp registering with a groove or channel 10 in the under side of the jaw 11. The jaw shown is of the stepped type and has countersunk holes 12 receiving screws 13 which enter tapped holes in the clamp 9.

On the upper surfaces of the jaw bases 7, on opposite sides of the clamp groove 8, are a series of alternating elevations and depressions, herein shown as square teeth 14 and sockets 15. On the undersides of the jaws are corresponding elevations and depressions likewise shown as square teeth 16 and sockets 17. The teeth 16 of the jaws fit the sockets 15 of the bases and the teeth 14 of the bases fit the sockets 17 of the jaws.

These coöperating teeth and sockets are differentially disposed on the three pairs of jaws and jaw bases; and this is graphically illustrated in Fig. 4 wherein I have designated the jaws as "jaw No. 1", "jaw No. 2" and "jaw No. 3", and the bases as "base No. 1", "base No. 2" and "base No. 3". The jaws and bases are similarly numbered on Fig. 1. The distance from the front face of one tooth or socket to the front face of the next tooth or socket is the same in all cases, and this distance is known and hereinafter referred to as the pitch. Now, by reference to Fig. 4, it will be noted that the first socket 15 on base No. 1 is closest to the chuck center and the first socket on base No. 2 and on base No. 3 are respectively one-third and two-thirds of a pitch farther from the center of the chuck. Likewise the first tooth on jaw No. 1 is nearest the front end of the jaw, and the first tooth on jaw No. 2 and jaw No. 3 are respectively one-third and two-thirds of pitch farther from the front end of the jaw. With the foremost teeth of the several jaws all occupying corresponding sockets in their respective bases, the work engaging faces of the jaws are all equally spaced from the center of the chuck.

Assuming now that the range of movement of the jaw bases, under their actuating devices, does not exceed, or but slightly exceeds, a pitch, the described differential arrangement of the teeth and sockets of the several jaws and jaw bases enables a fine adjustment of the jaws to be effected, such as will always maintain the jaws well within the range of movement of their actuating devices by simply shifting the jaws from one

jaw base to the next in one direction or the other around the face of the chuck, accordingly as it is desired to increase or decrease the diameter of the jaw grip. For instance, assuming each jaw to be engaged with its respective base, as illustrated in Fig. 4, if jaw No. 1 be transferred to base No. 2 with its foremost tooth in the foremost socket of base No. 2; jaw No. 2 be transferred to base No. 3 with its foremost tooth in the foremost socket of base No. 3, and jaw No. 3 be transferred to base No. 1 with its foremost tooth in the second socket of base No. 1, each jaw will then be moved back a distance from the center of the chuck equal to one-third of pitch. Similarly, if jaw No. 1 be shifted to base No. 3 with its foremost tooth in the foremost socket of the latter; jaw No. 2 be shifted to base No. 1 with its foremost tooth in the second socket of the latter, and jaw No. 3 be shifted to base No. 2 with its foremost tooth in the second socket of the latter, each jaw will then be moved back a distance from center equal to two-thirds of pitch; whereas it is obvious that the finest adjustment which can be made by shifting each jaw on its own base is three-thirds or the whole of pitch. Obviously, by shifting the jaws in the manner described in the reverse direction, they can be adjusted one-third or two-thirds of pitch nearer to the center.

Each jaw is readily adjustable lengthwise of its own base by simply backing out the screws 13 sufficiently to separate the teeth, then sliding the jaw and jaw clamp endwise to the desired position, and then re-setting the screws 13. Where the jaws are transferred to other bases than their own, it is, of course, necessary to loosen up the screws enough to separate the teeth and withdraw the jaw 10, clamp 9 and screws 13.

For convenience in effecting the adjustment of the jaws above described, whereby the latter are given universal movement and unrestricted range, the face of the chuck is conveniently marked with concentric circles as shown in Fig. 1, and suitable identifying numbers indicating their distances in inches from the center of the chuck.

Although I have shown and described my invention as applied to a three-jawed chuck, it is manifest that it is equally applicable to a chuck having any number of jaws, in which case the differential adjustment obtainable will be represented by a fraction of the pitch whose numerator is 1 and whose denominator is a numeral indicating the number of jaws. It is also manifest that the principle of the invention is applicable not only to chucks and analogous devices, such as tool holders, but also to any and all mechanical appliances which are equipped with a plurality of radially movable members mounted on bases or carriers having a limited range of movement.

I claim:

In an appliance of the character described, the combination of a carrier, a plurality of concentrically grouped radially arranged bases slidable endwise on said carrier and formed with alternating elevations and depressions which are located at different distances from the center or focus of the group on the several bases respectively, and a corresponding plurality of members removably attached to said bases and formed with alternating depressions and elevations interfitting with the elevations and depressions of said bases and located on the several members at different distances from the inner ends thereof; the distance differences being measured by a fraction of the space between the centers of adjacent elevations or depressions whose numerator is 1 and whose denominator is a numeral corresponding to the number of said bases or members.

IRA L. COLE.