

March 19, 1963

KATSUMI FUJII
QUICK ACTING VISE

3,081,995

Filed Oct. 19, 1959

2 Sheets-Sheet 1

FIG. 1.

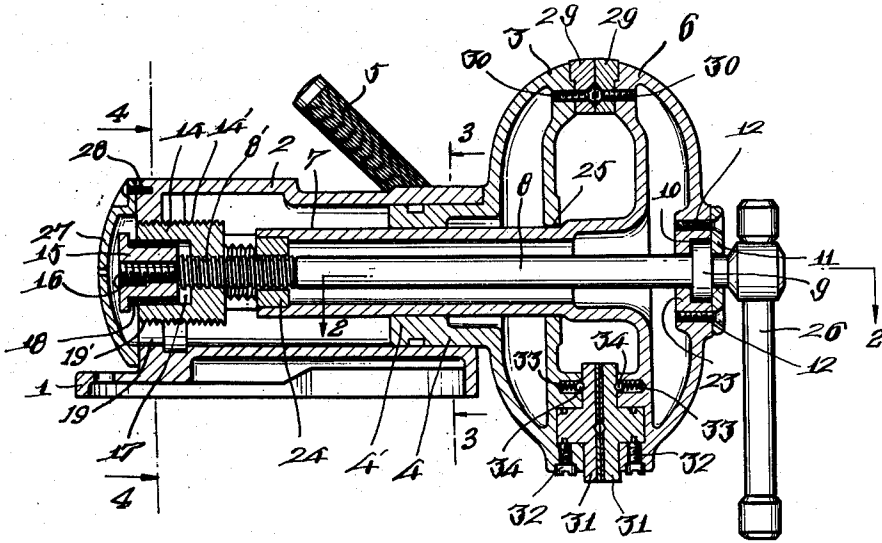


FIG. 2.

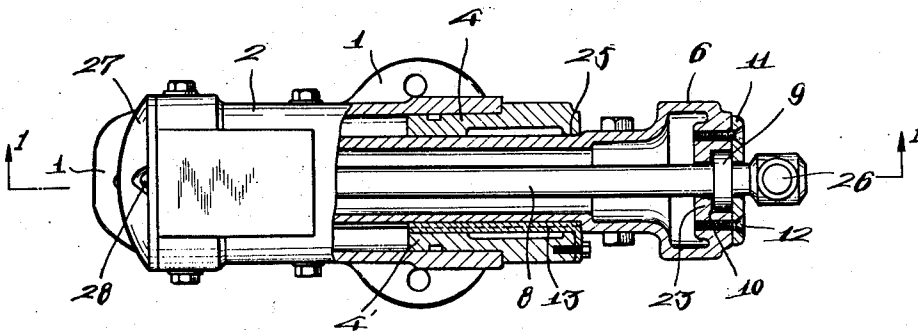
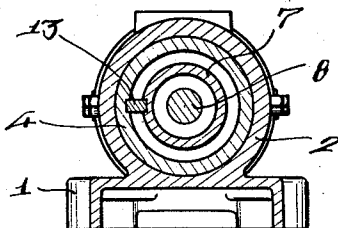


FIG. 3.



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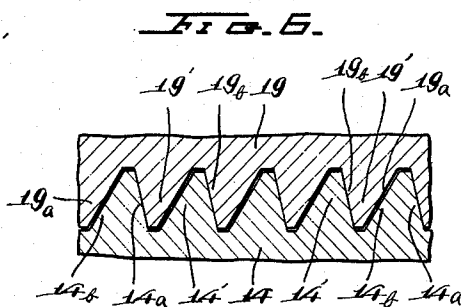
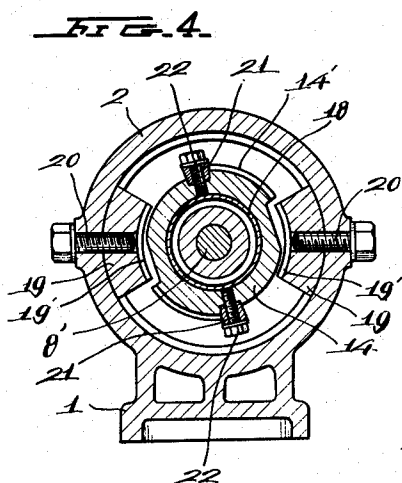
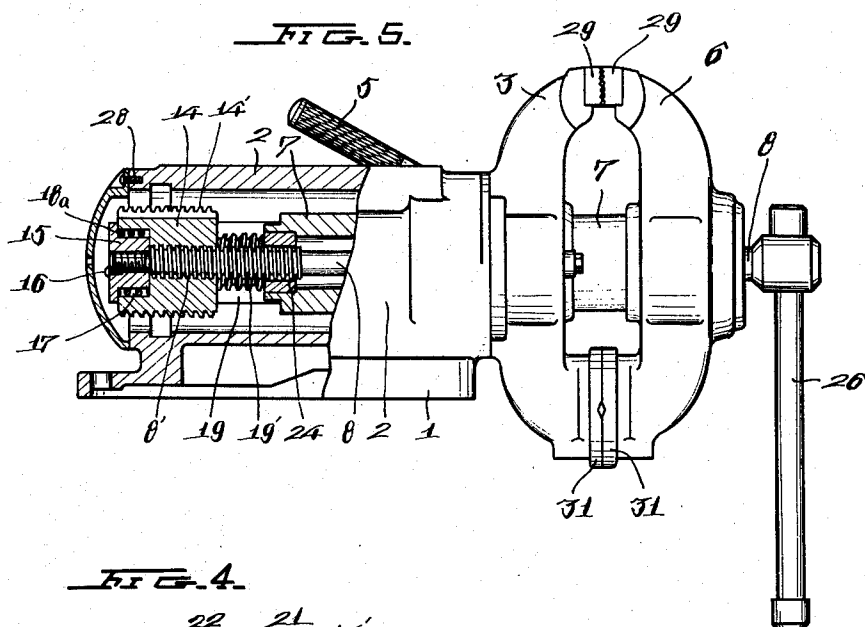
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Filed Oct. 19, 1959

2 Sheets-Sheet 2



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3,081,995

QUICK ACTING VISE

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Filed Oct. 19, 1959, Ser. No. 847,397
5 Claims. (Cl. 269—185)

This invention relates to an improved vise.

An object of the present invention is to provide an improved vise, wherein the movable jaw is able to travel quickly over a substantial distance, in other words, to move the movable jaw relative to the cooperating stationary jaw quickly to a substantial degree when work is squeezed between said jaws or the work is released from the squeezed position, as the case may be.

Another object is to provide an improved vise, wherein the necessary operation for movement of the movable jaw relative to the stationary one in the case of positioning work therebetween, or releasing it therefrom may be carried into effect in a simple manner.

Another object is to provide an improved vise, which is of light weight in unit, so an operator may treat and operate the vise in a simple and easy way.

Still another object of the present invention is to provide an improved vise, which operates in a positive and effective manner, so that the object squeezed between the jaws may be grasped in a stabilized manner, without being displaced unintentionally or oscillated by external forces while being mechanically operated upon.

These and other objects of the present invention will become apparent from the following description and the accompanying drawings, in which:

FIG. 1 shows a longitudinal section through a preferred embodiment of this invention, this section being taken through line 1—1 of FIGURE 2 looking in the direction of arrows 1—1.

FIG. 2 represents a horizontal section of the vise shown FIG. 1 taken in the plane passing through the central axis of the vise, part thereof being, however, shown in plan view, this section being taken through line 2—2 of FIGURE 1 looking in the direction of arrows 2—2.

FIG. 3 shows a cross-section taken on the line 3—3 in FIG. 1 looking in the direction of arrows 3—3.

FIG. 4 represents a cross-section taken on the line 4—4 in FIG. 1 looking in the direction of arrows 4—4.

FIG. 5 is a side view, part being, however, broken away, of a somewhat modified embodiment from the preceding one shown in FIGS. 1—4, inclusive;

FIG. 6 is an enlarged sectional view, illustrating the engaging relation between the movable jaw element and the cooperating stationary jaw element.

Now referring to FIGS. 1—4, showing the first embodiment of the present invention, reference numeral 1 represents a stationary base member, on which an outside shell 2 is mounted. A stationary jaw member 3 is provided with a backwardly projecting short cylinder 4 made integral therewith, said cylinder being rotatably fitted into the outside shell 2 at its front end as shown in FIGS. 1—3, inclusive. Handle 5, seen in FIGURE 1, may be manipulated to set any desired angular relative position between the otherwise stationary jaw member 3 and the shell 2 since handle 5 and the elements (not shown) operated thereby function in a manner well known to the art, additional description is omitted.

A movable jaw member 6 is provided with a rearwardly extending relatively longer cylinder 7 made integral therewith, said cylinder 7 being telescopically fitted into the aforementioned short cylinder 4 of stationary jaw member 3. A rotatable spindle 8 passes through the central bore of movable jaw 6, said spindle being

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provided adjacent the front end thereof with a collar or flange 9 made integral therewith and loosely fitted into a correspondingly shaped recess 10 formed at the centre of the front wall of movable jaw 6. The flange 9 is covered with a detachable cover 11, which is fixed onto the front surface of movable jaw 6 by means of a plurality of fixing screws 12 as shown in FIGS. 1 and 2, thus the spindle 8 being effectively prevented from slipping out of the assembled set. It will be understood from the foregoing, that the movable jaw 6 is always shiftable to and fro in the longitudinal direction of the vise. Key 13 is provided between the short cylinder 4 of stationary jaw 3 and the cylindrical extension 7 of movable jaw 6, thus allowing the latter jaw to move longitudinally thereof, but preventing any relative rotation thereof relative to the stationary jaw 3.

The spindle 8 is formed with male screw threads 8' thereon at its rear end, an engaging piece 14 meshing with said screw threads 8'. An internal-threaded screw plug 15 is screwed on the reduced end of the spindle 8, and is rigidly held in position by means of a set screw 16 screwed into a tapped hole defined by spindle 8 and plug 15. The plug 15 is movably inserted into a rear recess 17 formed in the engaging piece 14, said recess opening at its rear end. A leaf spring 18 is fixed on the plug 15 and presses against the internal surface of said recess 17, the resulting friction being large enough to operatively connect plug 15 with engaging piece 14 under normal operation of the vise, but small enough to allow said two members 14 and 15 to act separately as spring 18 slips when the engaging piece 14 is met by an unusually large resistance. As best seen from FIG. 4, the outside shell 2 is provided on its inner wall surface with a plurality of, say, two in the present preferred embodiment, carriers 19 fixed thereto and maintained in angularly spaced relationship by means of fixing screws 20. Each of said carriers being formed with an individual group of parallel teeth 19' at its inner surface. The engaging piece 14 is formed with groups of parallel teeth 14' at its outer surface, the number of said groups corresponding to that of the aforementioned teeth groups provided on carriers 19 and both kinds of parallel teeth having equal pitches adapted to engage with each other, when occasion desires as hereinafter described. A plurality of stops 21 is attached to the outer periphery of 14 by means of fixing screws 22, the number of said stops corresponding to the groups of teeth formed on said piece 14. These stops 21 serve to prevent further rotation of engaging piece 14, when the cooperating parallel teeth 14' are brought into and kept in engagement with each other by turning said piece in clockwise direction as seen from FIG. 4, until said stops brought into contact with carriers 19.

Groups of parallel teeth 14' provided on engaging piece 14 are arranged in diametrically opposite relation. The same applies to stops 21, groups of teeth 19' and thus to carriers 19 themselves.

Thus, when the spindle 8 is turned, by means of a handle 26 attached thereto, in the vise-loosening direction, the plug 15 mounted on the rear end thereof carries along the engaging piece 14 under the frictional resistance provided by spring 18, thus the teeth 14' are disengaged from the cooperating teeth 19' and thereby the movable jaw 6 is brought into its longitudinally shiftable condition.

More specifically, the spindle 8 together with movable jaw 6 is, in this condition, free to be drawn out in the forward direction.

When it is desired to grip a work by the above-mentioned vise between its operating jaws, the jaws can be opened in the simple and easy manner as just above de-

scribed. After the work has been inserted between thus opened jaws, the spindle 8 is turned by manipulating the handle 26 in the opposite or tightening direction, the engaging piece 14 is carried along under the influence of frictional resistance provided by the leaf spring 18, until the teeth 14' on the piece are brought into engagement with the mating teeth 19' formed on carriers 19 and the stops 21 are brought into contact with said carriers. Further rotation of spindle 8 under this condition causes the spring 18 to slip on the wall surface of recess 17 provided in the engaging piece 14, thus allowing spindle 8 to be screwed further into said piece 14, by which action the movable jaw 6 is caused to move toward the stationary jaw 3, thus squeezing the work tightly therebetween.

It will be clear from the foregoing that with the vise above explained the movable jaw 6 can be moved longitudinally of the vise in an amazingly quick manner and with highly simple and easy manipulation.

In the present vise according to this invention, both stationary and movable jaws 3 and 6 are made in hollow members in order to decrease the weights thereof. The movable jaw 6 is formed with a spindle-supporting hub 23 at the centre of its front wall, while the rearwardly projecting cylinder 7 has a considerable larger inside diameter than the outside diameter of spindle 8 and thus a relatively thin wall thickness, thereby leaving an appreciable gap between spindle 8 and cylinder 7. A bearing piece 24 is attached to the cylinder 7 at its rear end adapted to rotatably support the spindle 8 at a place in the neighborhood of the rear end thereof. As above mentioned, the stationary jaw 3 is made in a hollow member and provided at the centre of its front wall with an opening 25, through which the spindle rotatably passes, as shown in FIGS. 1 and 2. The jaw 3 is formed with a bearing flange 4' at the rear end of its cylinder portion 4, in order to rotatably support cylinder 7.

The operating handle 26 is slidably fitted, as in the conventional manner, at the front end of spindle 8. At the rear end of the shell 2, a cover 27 is detachably fixed thereto by means of a plurality of fixing screws 28. Easy access to the operating parts of the vise will be ensured by removing the cover 27 from the shell 2, in the case of, for instance, repairing or the like.

At the one side, preferably upper side of the vise, the cooperating jaws 3 and 6 are provided at their engageable opposite surfaces with wear-proof gripping pieces 29 made from any suitable hard metal and rigidly fixed to the relating jaws respectively, by means of fixing screws 30. At the opposite side, preferably lower side of the vise, the jaws 3 and 6 are provided at their cooperating surfaces with equally wear-proof gripping pieces 31 fixed thereto in opposite relation to each other by means of fixing screws 32, respectively, said pieces 31 being resiliently pressed in the engaging direction by means of balls urged by coil springs 33.

A second embodiment of the invention shown in FIG. 5, is substantially similar to the above described first embodiment in connection with FIGS. 1-4, except that in the second embodiment a coil spring 18a is employed in place of leaf spring 18 in the preceding embodiment. In the similar manner as in the aforementioned first embodiment, the coil spring 18a serves to exert a frictional force on the wall surface of recess 17 formed in the engaging piece 14.

In FIG. 1, groups of parallel teeth 14' and 19' formed on engaging piece 14 and carrier 19, respectively, are shown in their engaging relation with each other. As shown in FIG. 6, the parallel teeth 14' on engaging piece 14 are so shaped that each front tooth flank 14a is considerably steeper than the slope of each rear tooth flank

14b and the corresponding front and rear tooth flanks 19a and 19b are naturally shaped in the corresponding engageable manner with the mating tooth flanks 14a and 14b on said piece 14, respectively. By this arrangement, when both members 14 and 19 are brought into tightly engaging condition with each other, an appreciable gap will establish between each of cooperating less-sloped side teeth flanks 14b and 19a, while the opposite-side flanks 14a and 19b are brought into tight engagement with each other. Thus, in their engaging, but untightened conditions of teeth 14' and 19', they are kept in somewhat loose relation with each other, thus tightening and loosening of these teeth may be easily carried out without sticking or feeling appreciable resistance.

Although only two preferred embodiments have been illustrated in the accompanying drawings and described in the foregoing specification, it is to be expressly understood that the invention is not limited thereto. Various changes may also be made in design and arrangement of the parts without departing from the spirit of the invention and the scope of the appended claims, as the same will now be understood by those skilled in the art.

What I claim is:

1. A device of the class described comprising a first jaw means, a second jaw means movable toward and away from said first jaw means and adapted to grip an object therebetween, a shell to which said first jaw means is mounted, a spindle rotatably mounted to said second jaw means, a toothed means mounted internally of said shell, an engaging piece and frictional means constituting an operative connection between said engaging piece and said spindle; means mounting said engaging piece for movement between an engaged and a disengaged position with respect to said toothed means through rotation of said spindle; said engaging piece when in said disengaged position permitting said spindle to be moved axially without rotation thereof; means threadably mounting said spindle to said engaging piece; said engaging piece having threaded portions which are engageable with said toothed means.

2. The device as set forth in claim 1 in which the threaded portions of the engaging piece and those of the toothed means are steeper along their front engaging flanks than along their rear engaging flanks whereby when work is firmly gripped between said jaw means said front engaging flanks are in tight engagement and there is clearance between said rear flanks when work is engaged, thereby facilitating spreading of said jaw means upon release of the work.

3. The device as set forth in claim 1 in which there is a plug mounted to the end of the spindle and positioned within a recess of said engaging piece; said frictional means comprising a spring positioned in a space between the outer surface of the plug and the wall of the recess.

4. The device as set forth in claim 3 in which the frictional means comprises a leaf spring.

5. The device as set forth in claim 3 in which the frictional means comprises a coil spring.

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