C. W. THOMAS.

ADJUSTING MECHANISM.

APPLICATION FILED JUNE 12, 1918.

1,300,047.

Patented Apr. 8, 1919.

4 SHEETS—SHEET 1.

Fig. 1.

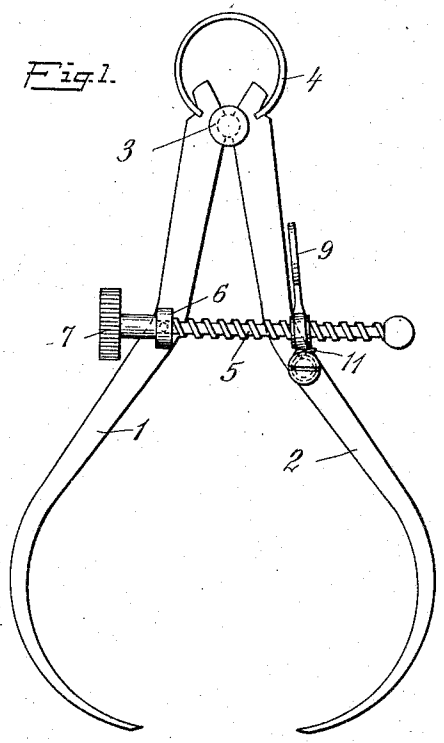


Fig. 2.

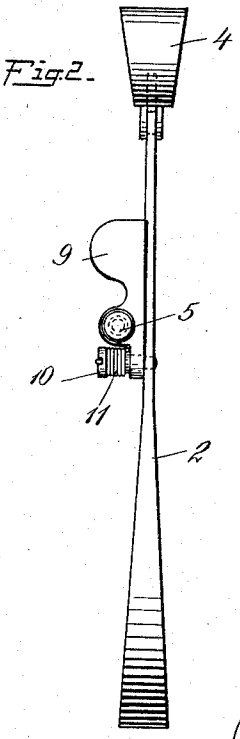


Fig. 3.

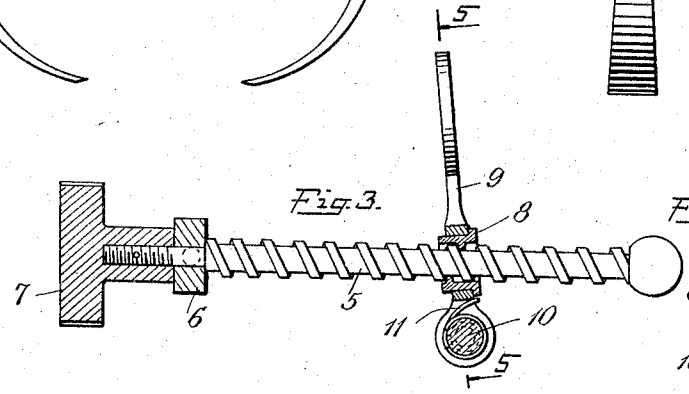


Fig. 5.

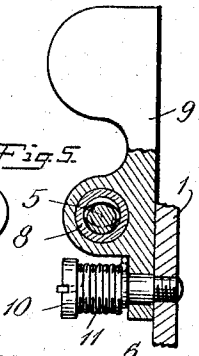


Fig. 4.

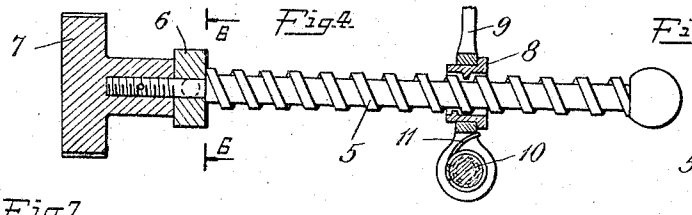


Fig. 6.

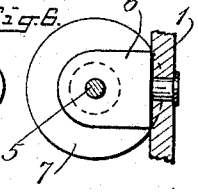
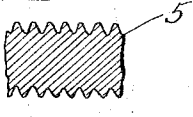


Fig. 7.



Inventor

Charles W. Thomas

By his Attorneys

Pennie, Davis, Marvin & Edmonds

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4 SHEETS—SHEET 2.

Fig. 8.

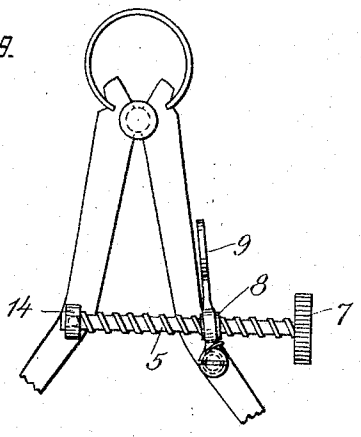


Fig. 10.

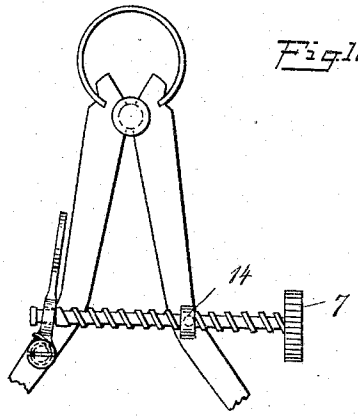


Fig. 9.

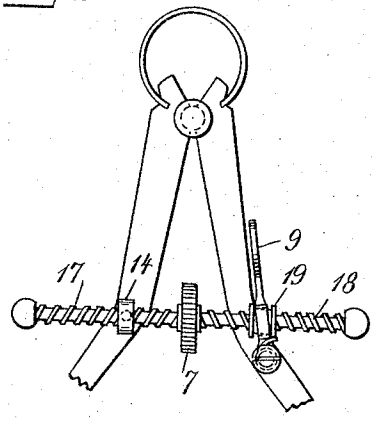


Fig. 11.

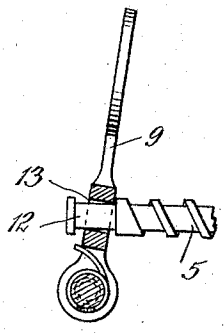


Fig. 12.

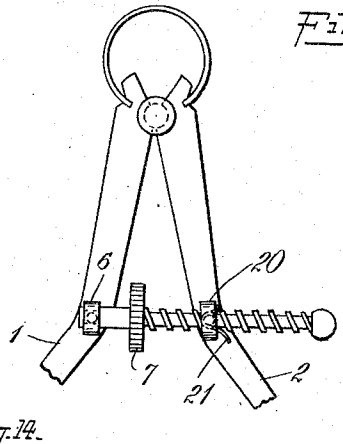


Fig. 13.

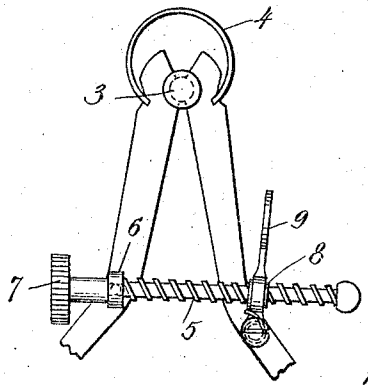
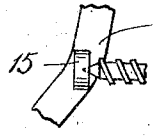


Fig. 14.



INVENTOR

Charles W. Thomas

BY

Pennie, Davis, Marvin & Edmonds

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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4 SHEETS—SHEET 3.

Fig. 15.

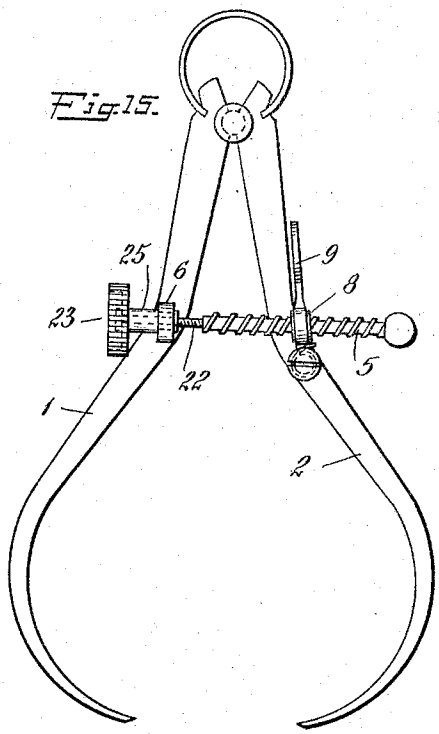


Fig. 22.

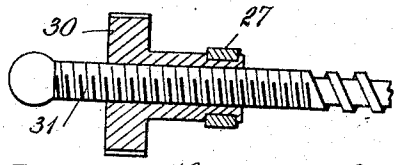


Fig. 23.

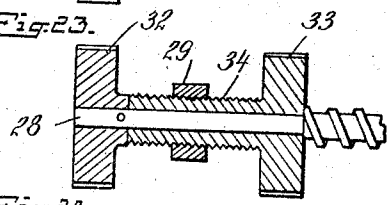


Fig. 24.

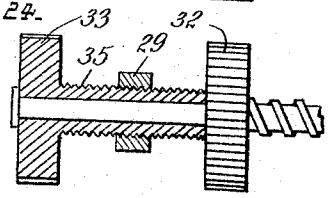


Fig. 25.

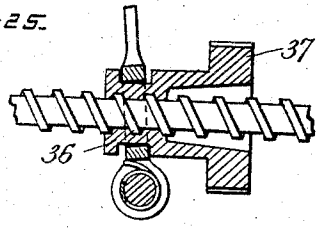


Fig. 16.

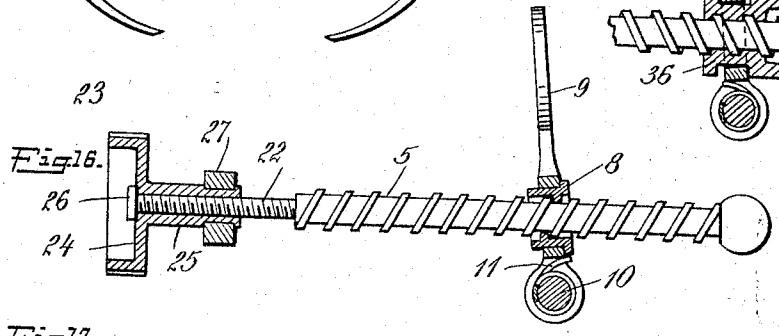


Fig. 17.

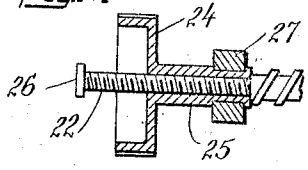


Fig. 20.

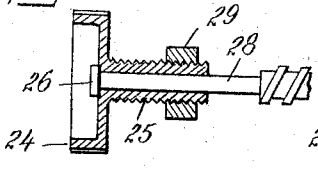


Fig. 19.

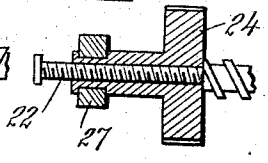


Fig. 18.

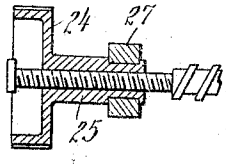
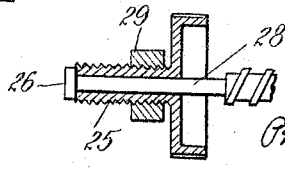


Fig. 21.



INVENTOR

Charles W. Thomas

BY

Pennie, Davis, Marvin & Edmonds

his ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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4 SHEETS—SHEET 4.

Fig. 26.

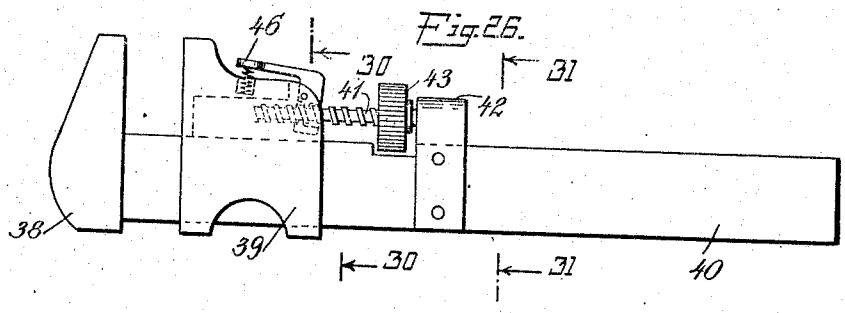


Fig. 27.

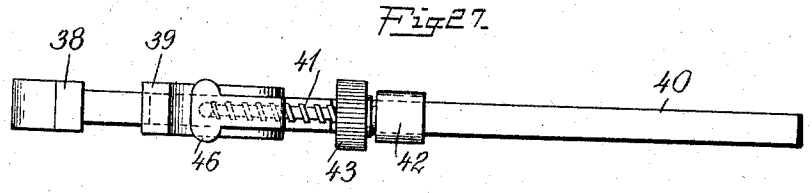


Fig. 28.

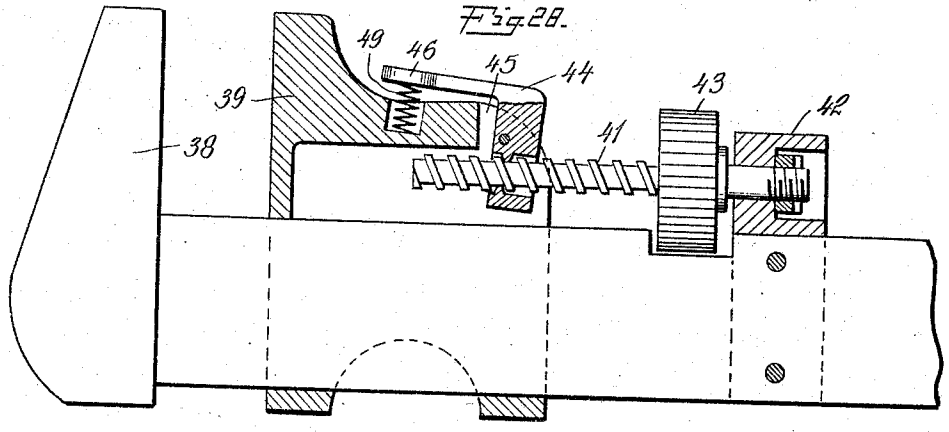


Fig. 30.

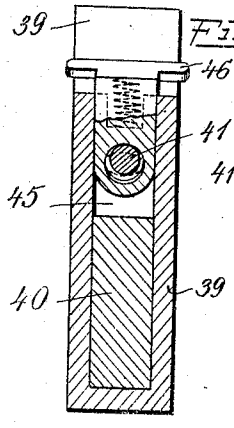


Fig. 31.

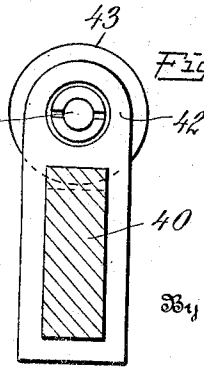
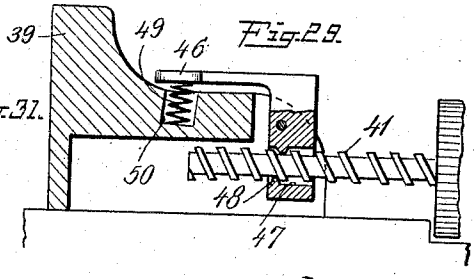


Fig. 29.



Inventor

Charles W. Thomas

By his Attorneys

Finnie, Davis, Marin & Edmonds

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES W. THOMAS, OF MADISON, WISCONSIN.

ADJUSTING MECHANISM.

1,300,047. Specification of Letters Patent. Patented Apr. 8, 1919.

Application filed June 12, 1918 Serial No. 239,679.

To all whom it may concern:

Be it known that I, CHARLES W. THOMAS, a citizen of the United States, residing at Madison, in the county of Dane, State of Wisconsin, have invented certain new and useful Improvements in Adjusting Mechanisms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to adjusting mechanisms, and is applicable generally to geometrical and surgical instruments and the like, and to such other tools and implements as comprise a pair of jaws or members, at least one of which is to be moved toward and from the other, both to effect an initial rough adjustment and a second or fine adjustment. This is the case in compasses, bow pens and pencils, calipers and other measuring and drafting instruments, in dilators and the like, and in wrenches and similar tools, in all of which implements either or both of the jaws, legs, or equivalent parts or members are adjusted in the manner indicated above.

It is an object of the invention to provide an improved adjusting mechanism which shall be capable of effecting the two adjustments aforementioned, irrespective of the class or type of instrument to which it may be applied; and which shall be readily and quickly operated, simple in construction and comparatively inexpensive to manufacture.

The invention maintains the same general construction for all types of instruments to which it is applicable; but is, of course, subject to slight changes in its structural details to conform to the individual types. In any case, however, it preferably embodies a threaded, rotatable adjusting member or screw, and a pivoted or similarly mounted controlling member which has a normal frictional engagement with the threaded adjusting member in such a manner as to preclude rotation thereof incidental to quick or coarse adjustment, while still permitting fine adjustment but which is releasable from such engagement for the purpose of effecting coarse adjustment.

Various forms which the invention may take in practice, are illustrated in the accompanying drawings, in which the same or corresponding parts and features are designated by similar reference numerals throughout the several views.

In the said drawings:—

Figures 1 and 2 are front and side elevations, respectively of one form of the invention, shown as applied to a pair of calipers.

Figs. 3 and 4 are enlarged detail views, partly in section, of the adjusting mechanism, showing the controlling member, in its normal and released positions, respectively.

Fig. 5 is a transverse section on line 5—5, Fig. 3, and Fig. 6 is a similar section on line 6—6, Fig. 4.

Fig. 7 is a fragmental, detail section of the adjusting member, showing one type of threads with which it may be formed.

Figs. 8, 9, and 10 are fragmental front views of slightly modified forms which the adjusting mechanism may take.

Fig. 11 is an enlarged detail view, partly in section, of the controlling member embodied in the modification shown in Fig. 10.

Figs. 12 and 13 are fragmental views of further modifications.

Fig. 14 is a view showing a modified form of bearing for one end of the threaded adjusting member.

Fig. 15 is a front elevation of an additional modification, showing the adjusting screw provided with both high and low pitch threads.

Figs. 16 to 18 are enlarged sectional views of the adjusting mechanism represented in Fig. 15, showing the extreme and mean positions assumed thereby.

Figs. 19 to 25 show enlarged, fragmental details, partly in vertical section, of still further modifications of details of the adjusting mechanism.

Figs. 26 and 27 are front and side elevations, respectively, of a wrench having the invention applied thereto.

Figs. 28 and 29 are enlarged detail views of the adjusting mechanism as thus applied, showing the controlling member in its normal and released positions, respectively.

Figs. 30 and 31 are transverse sections taken, respectively, on lines 30 and 31, Fig. 26.

Referring more particularly to the drawings, the improved adjusting mechanism is shown in Figs. 1 to 25 as applied to a pair of calipers; though it may, of course, be in-

corporated with equal facility, in any of the other types or characters of instruments above indicated. The calipers are, or may be, of conventional form, and comprise a pair of legs or members 1 and 2, pivoted together at 3 in the usual manner adjacent their upper ends, and having their terminals engaged, beyond said pivot, by a spring 4. The latter presses inward the said terminals or upper extensions of the members 1 and 2 and, hence, constantly tends to spread apart their bowed lower portions, this holding true for all forms of the invention as illustrated in the figures mentioned. In such instance, there is a movement of both members, as will be apparent; but it is to be understood that the actual movement may be limited to one member only.

The adjusting mechanism is employed to control this relative movement between the two members 1 and 2; and, while it may take various forms in practice, it comprises two main parts or elements, which are of the same or equivalent construction for all forms of the invention, viz: a threaded adjusting member, and a pivoted or similarly-mounted controlling member. The former has a supporting bearing on one leg of the instrument, and is normally engaged frictionally by the controlling member to prevent its rotation and the consequent coarse adjustment of the movable jaw or jaws, but is releasable to permit such adjustment, additional means being provided in connection with the adjusting member to enable fine adjustments to be effected while the controlling and adjusting members remain engaged.

In the construction represented in Figs. 1 to 6, the adjusting member, generally designated 5, consists of a transversely-disposed rod or screw provided with high-pitch threads of any suitable type, including those of the so-called Whitworth type depicted in Fig. 7. This screw is carried by a lug 6, which is pivoted to one of the legs of the instrument, in this instance the left-hand leg 1, at the point of intersection of the straight and bowed portions of the leg, so as to enable the lug to turn upon its pivot and thus accommodate itself to the changing angular relations of said screw, the lug having a central perforation through which the reduced end of the screw passes. The portion of the screw end beyond or to the left of the lug is threaded, and has fixed upon it a thumb-piece or cap 7, the purpose of which will be stated fully hereinafter. The screw is mounted to rotate in its carrier 6, but is normally held against such rotation by means of the aforementioned controlling member, through which it passes and which is here shown as in the form of a nut 8, mounted in and carried by a rocking lever 9, pivoted on a stud 10 set into the right-hand leg 2. The nut 8 is provided with an internal thread which corresponds with the threads on the screw, and, by reason of its mounting, is caused to rock or tilt with the lever 9, the latter normally occupying a leftwardly-inclined position due to the pressure imposed upon it by a spring 11 which is coiled around the pivot 10 and bears against the lever. (Figs. 3, 4, and 5). In consequence, the tilted or inclined position of the nut will cause its thread to bind against the screw in the manner illustrated in Fig. 3, with the result that rotation of the screw is checked and the legs 1 and 2 are held in the position which they happen to occupy.

When adjustment is necessary, assuming that it is desired to reduce the span of the legs, the free ends of the latter are pressed slightly toward each other, thereby causing an initial movement of the adjusting screw 5, to the right, with the result that the lever 9 is pushed in the same direction into a position in which it is substantially perpendicular to the screw, as indicated in Fig. 4. During this movement of said lever, the nut 8 is carried out of its tilted or inclined position, so that its thread no longer binds against the threads on the screw. Continued pressure upon the legs will then produce a rapid spinning or turning movement of the screw, and the legs will move toward each other until the approximate span or radius required is reached, whereupon the pressure is removed and the lever and nut are automatically restored to inclined or clamping position by the combined action of the springs 4 and 11. It will be observed, however, that the adjustment thus effected is of a comparatively coarse nature, due to the steepness of the threads of the screw. Consequently, means is provided, enabling fine adjustments to be made either at the completion of the first adjustment, or in lieu thereof if only a very slight change in span is needed. Such means preferably consists of the afore-mentioned cap or thumb-piece 7, which, as previously stated, is fastened to the screw, and, when turned in one direction or the other, will produce a slow or gradual rotary movement of the screw which can be carried out even while the nut and screw remain in binding engagement.

When it is desired to spread the legs apart, a slight pressure against the lever 9 causes it to move from the inclined position which is shown in Fig. 3 to the substantially-perpendicular one in Fig. 4, thus releasing the threaded adjusting member or screw as before. The spring 4 then acts through the legs to spin or turn the screw, and a greater span is the result. Releasing the pressure on the lever causes the nut 8 to reëngage the screw, as above explained, and

thereby terminates its rotation. Fine adjustments may then be made by turning cap 7 in the proper direction.

The same principles are involved in the construction illustrated in Figs. 8 to 11; but in Fig. 8 the thumb-piece is located on the end of the screw nearest the leg which carries the lever, while in Figs. 9, 10 and 11 the clamping or binding action, instead of being exerted directly upon the threads of the screw by an internally-threaded nut, is imposed upon the plain or unthreaded reduced end 12 of the screw, which is alternatively engaged and disengaged by the opposite edges of an opening 13 formed through the lever, as clearly shown in Fig. 11. The controlling member may be pivotally mounted either on the right-hand leg, as in the first construction (Fig. 8), or on the left-hand leg, as in Fig. 10; and similarly, the perforated carrier lug for the screw may here take the form of an internally-threaded nut 14, which may be pivoted on either leg, or in place of the aforesaid lug there may be substituted a lug 15 (Fig. 14) having a bearing or seat wherein the pointed end 16 of the screw is received. Finally, the thumb-piece or cap 7 may be located intermediate the ends of the screw, instead of being fixed to one end thereof, in which instance the two portions of the screw will be reversely threaded, as indicated at 17 and 18 (Fig. 9), the left-hand portion 17 extending through the pivoted nut 14 while the right-hand portion 18 passes through and is engaged by a tiltable clamping nut 19 carried by the lever. In this construction, the fine adjustments, when necessary, can be made with one hand.

In the modification shown in Fig. 12, the lever is omitted, and the controlling member consists solely of a pivoted nut 20, which is acted on by a spring 21 tending to normally engage it with the threads of the screw. The pivotal axis of the nut in this form intersects the axis of the screw, and the latter is rotated to effect rapid adjustments by means of the thumb-piece 7, which is located to the right of and near to the arm 1.

In all of the forms thus far described, the tendency of the spring 4 at the top of the instrument is to force the bow portions of the two members 1 and 2 from each other, due to the fact that the terminals of the spring are engaged with the ends of said members above the main pivot 3. It is possible, however, to reverse this arrangement, and utilize the spring to normally force together the bow portions of the members 1 and 2, in which case, as represented in Fig. 13, the ends of the spring will engage the said members below the pivot.

Figs. 15 to 18 show a further modification in which the screw is provided both with the steep or high pitch threads shown and described in connection with the forms previously discussed, and with a reduced portion 22 having low pitch threads thereon. The high pitch threads coöperate with the nut 8 and its carrier lever 9 in the same way as in the construction illustrated in Figs. 1 to 6; but the portion 22 with the low-pitch threads has fitted on it a cap or thumb-piece 23, the body 24 of which is hollowed or dished while its stem 25 has a threaded axial passage through which the reduced portion 22 extends, said portion 22 terminating at its free end in an enlargement or head 26. The lug 27, which is similar to the part 6, fits in a circumferential groove or recess in the stem 25.

Figs. 16 to 18 show the three main positions of the parts just described. In Fig. 16, which corresponds in this respect to Fig. 15, the head 26 is in contact with the inside surface of the dished or hollowed-out body portion 24 of the thumb-piece 23, so that a rightward movement of the lever 9 incidental to closing the legs of the instrument will revolve the screw, the latter moving to the left while the thumb-piece remains stationary. Fig. 17 shows the extreme position which the screw assumes in its leftward movement, the shoulder formed by the production of the reduced portion 22 contacting with the body 24, and when the parts are in this position, the closing of the jaws revolves the screw which moves to the right and rocks the lever in the same direction, the nut 8 moving with the lever and releasing the screw, while the head 26 is caused to approach the inside wall of the body 24 of the thumb-piece. In Fig. 18, the head 26 occupies a position intermediate the positions shown in Figs. 16 and 17, reaching this position from either of the two extreme positions represented in the figures just specified. In all of these positions, finer adjustments can be made by turning the thumb-piece.

The constructions depicted in Figs. 19, 20 and 21 are variations or developments of the arrangement shown in Fig. 15. In Fig. 19, however, the thumb-piece is so disposed that its milled body portion 24 lies at the inner side of and close to the left-hand leg 1; as in the construction represented in Fig. 12; and in Figs. 20 and 21, the reduced portion 28 of the screw is plain, instead of threaded, the thumb-piece being arranged reversely in Fig. 21 from its showing in Fig. 20, so that the head 26 contacts with the end of its stem 25 instead of with its body portion. Moreover, in these two figures, the aforesaid head 26 remains constantly in contact with the thumb-piece, the stem of which is exteriorly threaded, so that it will move in one direction or the other through the threaded part or nut 29, when turned and, hence, will effect the de-

sired fine adjustments of the screw. The thumb-piece shown in Fig. 19 is solid, instead of being dished, and the pivoted lug or part 27 seats in a circumferential groove in its stem, as in the construction indicated in Figs. 16 to 18.

Figs. 22 to 25 show still further variations or developments of constructions previously discussed. Thus, in Fig. 22, which is a modification of Fig. 9 in so far as it is intended to include a lever and tiltable clamping nut of the type therein indicated, the thumb-piece 30 is mounted on the low-pitch threaded portion 31 of the screw and extends beyond the left-hand leg or member 1. In Figs. 23 and 24, two separate thumb-pieces, designated 32 and 33 are employed for effecting coarse and fine adjustments, the arrangement in one case being the reverse of that in the other. Thus, in Fig. 23, the thumb-piece 32 for effecting coarse adjustments, is secured to the reduced portion 28 of the screw outside of the leg or member 1; while the other thumb-piece 33 which is used for fine adjustments, has an exteriorly-threaded stem 34, which passes through the threaded opening in the pivoted nut 29; whereas in Fig. 24, the thumb-piece 33 is located at the outside of the member 1 and is formed with an exteriorly-threaded stem 35. The inner thumb-piece in both instances is confined between the outer thumb-piece and the shoulder formed at the junction of the high-pitch portion of the screw and its reduced portion or extension 28, said portion being represented in Fig. 24 as equipped with a terminal head.

The construction shown in Fig. 25 embodies the formation of the nut and thumb-piece, designated, respectively 36 and 37 integral with each other, the clamping action being obtained similarly to that described in connection with Figs. 10 and 11.

In Figs. 26 to 31, the invention is represented as incorporated in a wrench, in which 38 and 39 indicate, respectively, the fixed and movable jaws, and 40 the shank. The movable jaw shifted toward and from the fixed jaw by means of an adjusting mechanism which, as in the other forms of the invention, comprises a threaded rod or screw 41 journaled in a lug or bracket 42 on the shank 40, a thumb-piece 43 secured to said screw and a pivoted controlling member 44. The last-mentioned part is mounted in a recess 45 in the movable jaw, and is here shown as having the form of an angular lever, the outer arm of which is enlarged or widened at its extremity to provide a finger-piece 46, while the inner arm is furnished with a transverse opening 47 for the passage of the screw 41 therethrough, this opening having an internal thread 48 similar to that of the nut 8. The lever 44 is normally held in tilted position by means of a spring 49, which bears against the under face of the finger-piece 46 and is seated in a recess 50 provided in jaw 39, as illustrated in Fig. 28, with the result that the thread 48 frictionally engages the threads on the screw and thus tends to hold the latter against rotation, while still permitting a slight degree of fine adjustment, just as is the case with the form represented in Figs. 1 to 6. When a relatively coarse adjustment becomes necessary, it is merely necessary to depress the finger-piece 46 into the position shown in Fig. 29, whereupon the binding engagement between the thread 48 and the screw will be broken, and the screw may be rotated freely in either direction by means of its thumb-piece 43.

It will be seen, therefore, that the operation of the improved adjusting mechanism as applied, for example, to a wrench, is practically identical with that described above in connection with the calipers; and the same holds good of course, when the said mechanism is incorporated in the several other types of instruments and the like referred to at the commencement of the specification. Further description of the invention, its mode of operation and its advantages is considered unnecessary in view of the foregoing, and is, accordingly, omitted; but it is to be understood that parts of the invention, as shown and described, may be used without others, and in other and different environments.

I claim as my invention:—

1. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a rotatable adjusting element carried by one of said members, and a pivoted controlling element having a normal frictional engagement with said adjusting element to prevent coarse adjustment of the movable member, but releasable to permit such adjustment.

2. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a rotatable adjusting element carried by one of said members, a pivoted controlling element having a normal frictional engagement with said adjusting element to prevent coarse adjustment of the movable member, but releasable to permit such adjustment, and means connected to rotate said adjusting element while so engaged, to effect fine adjustment of said movable member.

3. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a rotatable adjusting

element having engagement with one of said members, and a tiltable controlling element having a normal engagement with said adjusting element to check rotation of the same, but releasable to permit free rotation thereof.

4. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a threaded adjusting element having engagement with one of said members, and a tiltable controlling element having a normal frictional engagement with the threads of said adjusting element to check rotation of the latter, but releasable from such engagement to permit its free rotation.

5. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a rotatable adjusting element having engagement with one of said members, and a tiltable controlling element having a normal frictional engagement with said adjusting element at two points spaced from one another to check rotation of said adjusting element, but releasable from such engagement to permit its free rotation.

6. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a rotatable adjusting element having engagement with one of said members, and a controlling element formed with a transverse opening through which said adjusting element extends; said controlling element being tiltably mounted to engage said adjusting element at diametrically opposite points in consequence of its passage through said opening, so as to check rotation of said adjusting element, but releasable from such engagement to permit its free rotation.

7. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a threaded adjusting element rotatably connected with one of said members, and a controlling element formed with a transverse opening through which said adjusting element extends; said controlling element being tiltably mounted to frictionally engage the threads of said adjusting element at diametrically opposite points in consequence of its passage through said opening, so as to check rotation of said adjusting element, but releasable from such engagement to permit its free rotation.

8. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a threaded adjusting element rotatably connected with one of said members and having threads of high pitch, and a controlling element having a normal engagement with said threads at diametrically opposite points to check rotation of said adjusting element, but tiltable out of such engagement to permit its free rotation.

9. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a threaded adjusting element rotatably connected with one of said members and having threads of high pitch, and a controlling element having a normal engagement with said threads at diametrically opposite points to check rotation of said adjusting element, but tiltable out of such engagement to permit its free rotation, and means for imparting slow, gradual rotation of said adjusting element while engaged by said controlling element.

10. The combination, with a pair of co-operating members, at least one of which is movable toward and from the other; of an adjusting mechanism for controlling such movement, comprising a threaded adjusting element rotatably connected with one of said members and having threads of high pitch, and a controlling element having a normal engagement with said threads at diametrically opposite points to check rotation of said adjusting element, but tiltable out of such engagement to permit its free rotation, and a thumb-piece connected to said adjusting element to enable a slow, gradual rotation thereof while engaged by said controlling element.

In testimony whereof I affix my signature.

CHAS. W. THOMAS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."