

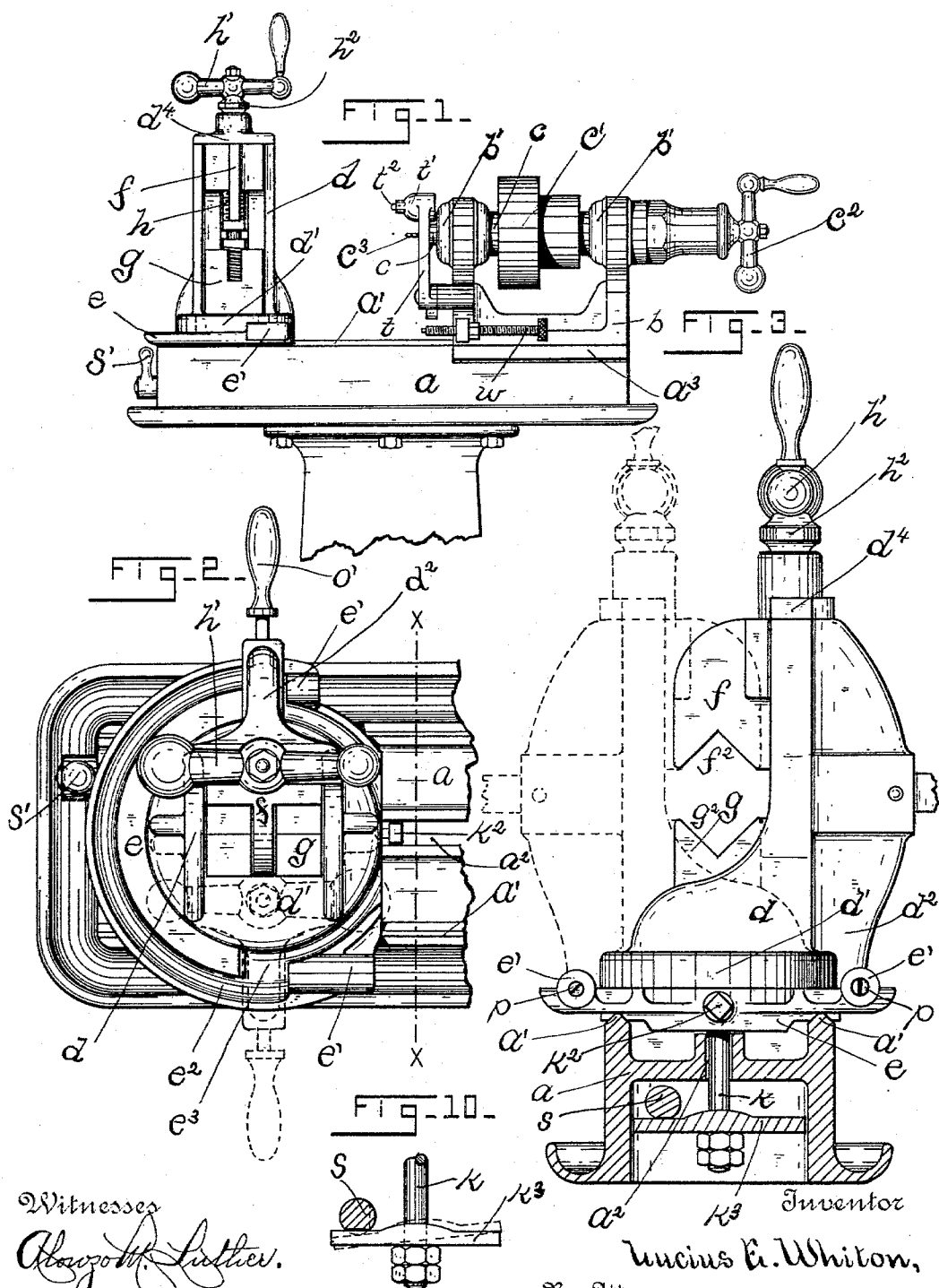
(No Model.)

2 Sheets—Sheet 1.

L. E. WHITON.
CENTERING MACHINE.

No. 571,817.

Patented Nov. 24, 1896.



Witnesses
Alfred M. Luther.
Lila D. Peale.

Inventor
Lucius E. Whiton,
By Attorney
Frank H. Allen.

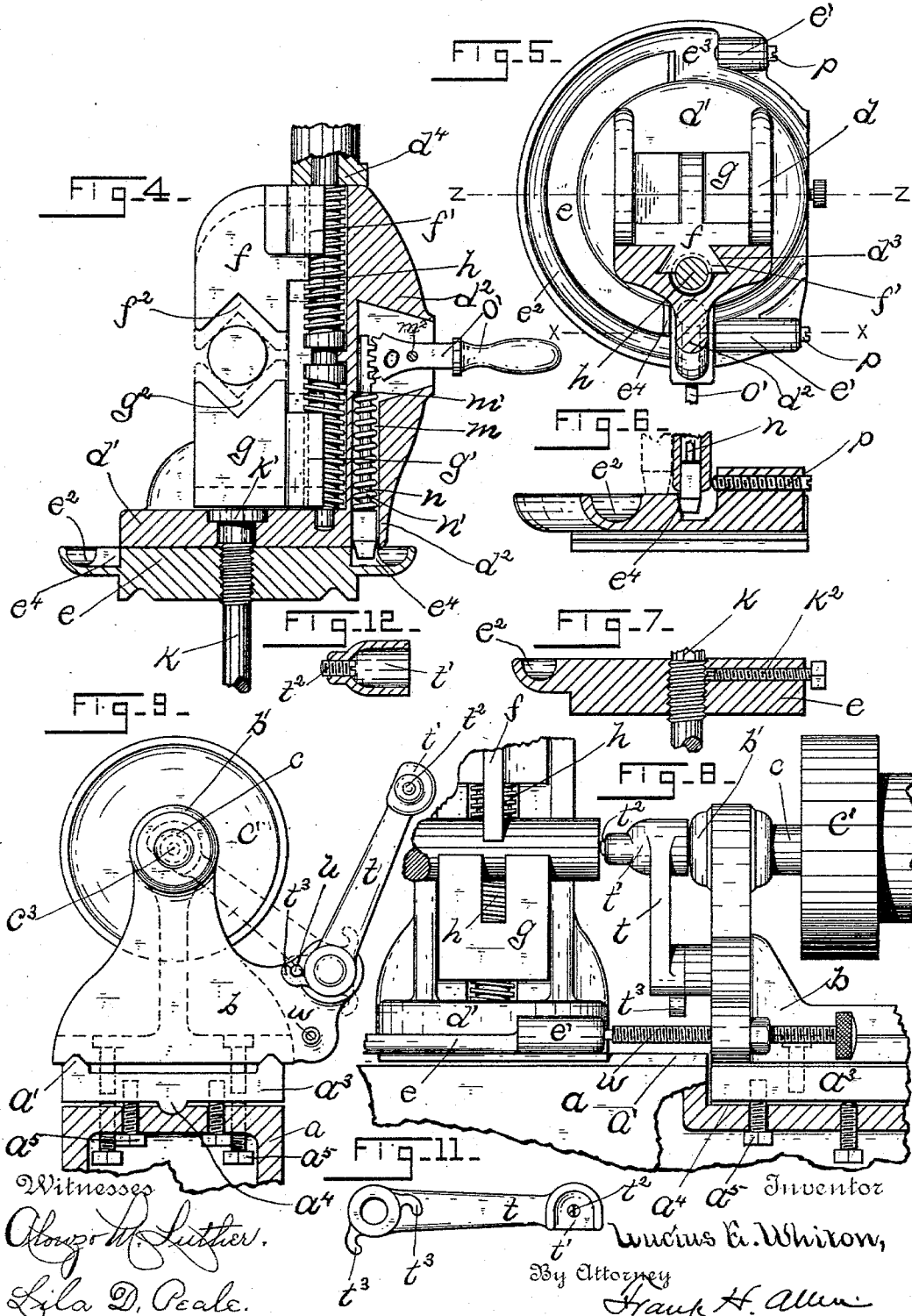
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

LUCIUS E. WHITON, OF NEW LONDON, CONNECTICUT.

CENTERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 571,817, dated November 24, 1896.

Application filed January 19, 1895. Serial No. 535,568. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS E. WHITON, a citizen of the United States, residing in the city and county of New London and State of Connecticut, have invented certain new and useful Improvements in Centering-Machines, which improvements are fully set forth and described in the following specification, reference being had to the accompanying two sheets of drawings.

On the 22d day of April, 1890, Letters Patent of the United States numbered 426,347 were granted unto David E. Whiton and myself for certain improvements in drilling-machines, and my present invention is in this same class of machinery, my improvements being specially applicable to "centering-machines," so called, and other machinery analogous thereto. These present improvements relate particularly to the manner of supporting the work while being operated upon and to the construction of certain elements of such machinery, to the end that such elements may be assembled and properly adjusted more readily and with less labor than has been possible heretofore.

To assist in the explanation of my invention, the accompanying drawings have been provided, in which—

Figure 1 is an elevation of a centering-machine provided with the various improvements hereinafter described and explained in detail. Fig. 2 is an enlarged plan view of the left-hand portion of Fig. 1. Fig. 3 is a vertical sectional view of the machine-bed, taken on line $x x$ of Fig. 2, and shows mounted on said bed in elevation my improved work-supporting vise. Fig. 4 is a view of said vise in vertical section. Fig. 5 is a plan view of said vise, showing the upper portion of its framework in horizontal section. Fig. 6 is a vertical sectional view of a circular plate on which the vise is pivotally supported, said view being taken on line $x x$ of Fig. 5. Fig. 7 is a view similar to the said Fig. 6. Fig. 8 is an elevation of a portion of a complete centering-machine, illustrating particularly a certain gage pivotally secured to the drill-spindle frame and showing also the manner in which, by the proper use of the latter, the said vise is adjusted on the machine-bed relatively to the drill. In this view a portion of the side

of the bed of the machine is broken away to expose to view the means provided for the ready adjustment of said framework to bring the drill in proper alinement with the work-supporting vise. Fig. 9 is a cross-sectional view of the machine-bed, showing properly mounted thereon the drill-spindle frame, also the adjusting-gage pivotally secured thereto, and the said means provided for the adjustment of the drill-spindle frame. Fig. 10 illustrates the manner in which the vise is locked at any desired point on the machine-bed. Fig. 11 is a detached view of the gage already referred to, and Fig. 12 is a longitudinal sectional view of the free end of said gage.

Machines of the class referred to consist, briefly described, of a bed portion a , upon which is properly mounted, near one end, a suitable head-block or framework b , provided with bearings that support a drill-spindle c . Drill-spindle c bears one or more pulleys by means of which the machine may be connected by belt with a suitable counter-shaft. On machine-bed a (at the left hand of the head-block, as here shown) is also located some suitable device by means of which work to be drilled and centered is supported. This device is adjustable on the machine-bed either toward or away from the drill in order to bring the work carried thereby into engagement or to carry the same out of contact with said drill.

It is my aim in this invention to provide a work-supporting device superior to those now in use, and to this end I have constructed the above-referred-to vise, which forms an essential feature of this invention, and which, together with the said spindle-frame adjustment, gage, &c., helps to perfect this class of machinery and increase its usefulness.

Referring again to the drawings, a indicates the bed of a centering-machine, and b a head-block located thereon, which supports in suitable bearings b' a drill-spindle c . Spindle c is shown as provided with a cone-pulley c' . Said spindle is shown as provided at one end with the usual operating-handle c^2 , and the opposite end thereto is properly constructed to receive and support a drill c^3 .

d indicates my work-supporting vise as a whole, said vise being mounted over the ma-

chine-bed and capable of adjustment relatively to the drill c^3 . Vise d , instead of being mounted directly upon the machine-bed, is supported upon a circular plate e , upon which latter the said vise is centrally swiveled in a manner and for a purpose hereinafter explained. Bed a is provided upon its upper side with tracks a' , extending in the direction of and parallel to the length thereof.

10 Circular plate e (supporting the vise d) rests on these ways a' and when desired may be moved thereon, plate e being provided on its under side with grooves suitable to coact with said ways. I shall describe hereinafter means by which plate e may be locked to the ways a' and thus be prevented from movement on the bed a after adjustment.

Referring now particularly to the construction of the work-supporting vise, the reference-letter d' denotes a circular base-plate forming the lower portion thereof. When vise d is mounted upon plate e , its base-plate d' is swiveled to plate e , as already mentioned. From base-plate d' the main portion of the vise-frame extends upwardly. This upwardly-extending portion is located at one side of the axial center of the base-plate d' and serves to support the jaws of the vise, which latter are denoted by letters f and g .

30 Each jaw f and g is provided with a rib extension, denoted, respectively, by letters f' and g' , conforming in shape to and fitted to slide in a dovetail groove d^3 , extending vertically in the vise-frame d , said extensions, when thus in position, serving also to maintain jaws f and g in vertical alinement.

The letter h denotes a right and left hand screw located in the rear portion of the dovetail groove and extending vertically therein, the said groove being properly chambered for the reception of said screw. The lower end of screw h is seated in the base-plate d' , and the upper end thereof is supported in a suitable bearing d^4 , through which the screw passes, and in order that it may be readily rotated a handle h' is secured to its upper end. Screw h engages the inner faces of the extensions f' and g' , which latter are properly threaded to coact with said screw, and it will be readily understood that the rotation of the screw h will cause extensions f' and g' to travel either toward or away from each other, according to the direction of such rotation of the screw. The screw h and the connected jaws f and g may be adjusted together vertically a limited distance by means of a threaded nut h^2 , mounted upon the upper end of said screw. By properly rotating said nut (which rests upon the upper end of the bearing d^4) the screw h and its connected parts may be raised or lowered slightly, thus providing a limited vertical adjustment of the vise-jaws relatively to the drill.

The grasping or clamping portions of the jaws f and g are so shaped as to best hold the class of work for which it is desired to use the machine. As these machines are usually

used for centering the ends of round rods, I have here shown the confronting clamping portions of said jaws as provided with V-shaped notches f^2 and g^2 , respectively. Should the article to be clamped be placed between the jaws, as shown in Figs. 4 and 8, it will be seen by reference to said figures that the jaws when brought up against the said article will tightly grasp and hold the same. To permit jaws f and g to come sufficiently close together to clamp rods of very small diameter, the jaw f is made quite thin, and a central vertically-extending opening to coact therewith is provided in the jaw g . (See Figs. 1, 2, and 8.) With jaws f and g formed as described it will be seen that through the proper rotation of screw h said jaws may be so brought together as to completely close the opening between them, thereby making it possible to clamp rods from the smallest diameter up to those of considerable size.

The preferred shape of jaws f and g and the manner in which the same are operated to clamp the work is best seen in Figs. 1, 3, 4, and 8, and by reference to said figures it will be seen that that particular part or end of the work to be centered by the drill c^3 is in the same horizontal plane as said drill; also, that the longitudinal center of the work is in vertical alinement with the swiveled center of the vise.

It is frequently desired to center each end of the work operated upon by this class of machinery. To facilitate this operation, I have so constructed the vise d that (excepting in cases where the piece to be centered is of unusual length) each end of said piece may be in turn introduced to the drill c^3 . This feature avoids the necessity of removing the work from the vise after one end has been drilled and again clamping the same, in order that its other end may be similarly operated upon. To make this possible, I have swiveled vise d upon its supporting-plate e , as already mentioned. The location of the ways in which the vertically-movable jaws slide at one side of the axial center of the base-plate d' should be particularly noted. This arrangement locates the supports for the jaws and their adjusting devices so far back from the holding portions of the jaws that much shorter rods may be centered than if horizontally-movable jaws were provided and located one on either side of said axial center. This will be clearly understood when it is remembered that plate d' swings only half-way around, and in thus swinging to present opposite ends of the rod to the drill the supports of the vise—i. e., the vise-frame, handle o' , &c.—swing away from said drill and are never caused to pass between said axial center and the drill. Referring particularly to the manner in which such swiveling is accomplished, the letter k indicates a vertical rod which serves as an axial center on which the vise d turns. Rod k passes downward through the plate e and is tapped into said plate. Rod k

projects upward into the base-plate d' , and to secure the latter pivotally thereto a head k' is formed on the upper end of said rod. When plates e and d' , together with rod k , are assembled in the manner described, it will be understood that by properly rotating the threaded rod k said plates may be drawn tightly together or may be so adjusted that the plate d' may be freely turned upon the plate e . When such proper adjustment has been attained, rod k may be secured against accidental rotation by means of a set-screw k^2 , located in said plate. (See Fig. 7.) The outer end of said screw k^2 projects radially from any convenient point of the circumferential edge of the plate e .

The manner in which vise d is turned upon its swivel-point is shown in Figs. 2 and 3, from which views it will be seen that by the use of this feature either end of a piece of work supported in the vise can be readily presented to the drill in proper position to be operated upon by the latter.

That portion of rod k projecting downward from plate e forms an element of a certain locking device provided for securing the vise against accidental displacement on its ways a' , said locking device being fully described hereinafter.

In connection with the feature of swiveling vise d I have also provided means to prevent any vibration or partial revolution thereof on its pivot while the drill e^2 is at work. The framework d (in which is cut the dovetail groove d^2) is provided in the lower portion of a radial extension d^2 thereof with a vertically-extending chamber m , within which is located a bolt n , that is encircled by a spiral spring n' , confined between the enlarged head of said bolt and a shoulder m' in the chamber m , the tendency of said spring being to force said bolt n downward. The upper end of bolt n is formed as a rack, the teeth of which are in meshing contact with those of a gear-segment o , pivotally secured at m^2 within chamber m , said segment o having an operating-handle o' extending outward from chamber m . By means of the operating-handle o' bolt n can be raised against the pressure of its encircling spring n' .

Plate e is provided on its upper face with two buffers e' , located within the circular path described by extension d^2 of frame d when the vise is revolved on the pivot k , during which movement of the vise the bolt n also rides in a circular path upon the face of plate e . Buffers e' serve as stops to limit the rotation of vise d to an exact half-revolution, (see Fig. 2,) the lower portion of extension d^2 coming into contact with one of the said buffers e' (or rather with the end of an adjusting-screw p , located in each of said buffers) at the completion of such half-revolution in either direction. It should be noted in this connection that when extension d^2 is in contact with either of the screws p the vise d is or should be in such alinement relatively to

the drill-spindle as to properly present to the drill any work clamped in and carried by said vise.

Plate e is provided with an oil-groove e^2 concentric with rod k , with the exception that said oil-groove crosses the path described by the bolt n directly in front of each buffer e' , said points of crossing being denoted in the drawings by letter e^3 . Groove e^2 is made sufficiently large and of proper shape at the points e^3 to receive the lower end of bolt n . The instant extension d^2 comes into contact with the screw p of either buffer the bolt n will at once snap downward into the space e^3 of groove e^2 directly in front of said buffer, and, as a result, the complete vise will be locked in position for use, Figs. 2 and 6. When it is desired to again turn the vise, the handle o' is first properly operated to withdraw bolt n from the point e^3 of groove e^2 . When said bolt is withdrawn, the vise is free to be swung a half-turn upon its pivot, at the completion of which half-turn the extension d^2 comes in contact with the screw p of the opposite buffer and the bolt n snaps into the space e^3 adjacent to said last-named buffer, thereby again locking the vise.

It will now be readily seen that by means of screws p the buffers e need not be accurately fitted, said screws being easily adjusted to check the rotation of vise d at just the point desired.

That portion of the wall of groove e^2 with which the bolt comes in contact when locked is preferably beveled somewhat, as at e^4 , Figs. 4, 5, and 6, to conform with the beveled end of the bolt n . As said bolt is forced downward by its spring its end wedges against said beveled wall and thus serves to hold the vise rigidly and prevent all possibility of vibration.

To secure disk e and its superimposed parts in any position on bed a within the limits of the ways a' , the following-described locking device has been provided: The lower end of rod k passes downward into the machine-bed through a slot a^2 in the top thereof, said slot being of considerable length and extending in a direction parallel to the length of the machine. By reference to Figs. 3 and 10 it will be seen that near the lower end of said rod k is hung a bar k^3 , one of whose ends lies directly beneath and preferably in contact with a rod s . Rod s is parallel to the slot a^2 , is of a length somewhat greater than the possible travel of the carriage, and is suitably supported in bearings in the machine-bed. At one end of said machine (the left hand, as shown in the drawings) said rod s extends through the end wall of the bed and bears upon its outer end an operating-handle s' . The circumferential surface of rod s has a flattened portion extending throughout a considerable part of its length, and such flattened portion is shown in the said Figs. 3 and 10 as being in contact with the bar k^3 . It will be apparent that should said rod s be rocked the

rounded portion of its surface will be brought as a cam into contact with the bar k^3 , thus crowding downward said bar k^3 , (see dotted lines in Fig. 10,) the latter drawing with it the rod k , causing the plate e to bind upon its ways and thus prevent accidental movement of the plate on said ways. When rod s is again rocked to bring its flattened portion in contact with the bar k^3 , the strain is at once relieved on said rod k , leaving the plate e again free to be moved.

From the manner in which plates e and d' , together with rod k , are assembled (already fully explained) it will be apparent that any downward strain of rod k to clamp the plate e will in no wise affect the plate d' to prevent the easy rotation of the latter.

I have already referred to an important improvement embodied in this invention relating to the manner of mounting the drill-spindle frame b upon the machine-bed, comprising certain means of adjustment for said frame. This improvement consists of securing frame b to an intermediate plate a^3 instead of directly to the machine-bed. Plate a^3 conforms in shape to the top of the machine-bed and has formed on its under side a semicircular rib a^4 . A groove for the reception of said rib is formed on the top central part of the machine-bed, and when rib a^4 is in place therein the plate a^3 is capable of being rocked slightly on said rib. It should be noted that that portion of the top of the machine-bed lying directly under the plate a^3 is sufficiently depressed, so that when the plate a^3 is in position said plate forms practically a continuation of the bed proper of the machine.

Plate a^3 is secured to the machine-bed by means of screws a^5 , certain of which pass upward through openings in the top of the machine-bed and are tapped into the plate a^3 , and others simply extended upward through the top of said machine-bed to serve as gages or studs against which the bottom of plate a^3 may abut and be clamped by the first-mentioned screws a^5 . By reference to Figs. 8 and 9 it will be seen that plate a^3 may be rocked on its rib, as already described, and that when thus rocked the frame b , mounted thereon, will be correspondingly moved. The frame b may thus be rocked and adjusted until the drill-spindle c is in the proper position relatively to the vise d , and when such position is reached it will be apparent that by properly manipulating the various screws a^5 the plate a^3 may be securely locked to the machine-bed a .

With the above-described manner of mounting the drill-spindle frame a very accurate adjustment of the same can be secured without the necessity of finely fitting said frame and accurately mounting it upon the machine-bed, thus avoiding considerable labor, which otherwise would be necessary.

Reference-letter t denotes a gage which I have provided in connection with this class

of machines, by the use of which the work may be readily adjusted relatively to the drill. Gage t consists of an arm pivotally secured at one end to the drill-spindle frame. (See Figs. 8 and 9.) The free end of arm t is cup-shaped, as at t' , and said arm is so pivoted that when properly rocked such cup-shaped portion t' may inclose the outer end of the drill-spindle and also the drill located therein, and when in this position the end wall of the cupped portion is in contact with and supported by the end of the journal-bearing in which the drill-spindle revolves.

When in use, gage t is first rocked to the position just mentioned, and the vise d is then moved forward on its ways until the work carried thereby comes in contact with said gage or preferably with an adjusting-screw t^2 supported therein. The screw t^2 is so adjusted in the cup portion t' that when the work abuts the same said work is then in proper position relatively to the drill to be operated upon by the latter. Vise d is then locked in position, gage t is rocked out of the way, and the machine is then ready to be started. Gage t is preferably provided with stops t^3 , which, coacting with a stud u , located near the pivotal support of the gage, as shown, serve to limit the rocking of said gage and thus hold the same ever in position for use.

In addition to the gage t an auxiliary gage or stop w may be provided, consisting simply of a screw supported in the frame b in the manner shown in Figs. 1, 8, and 9. This last-named gage is useful when it is desired to regulate the position of the vise d upon the bed regardless of the position of the work which said vise holds. When it is desired to use said screw-gage w , it is so adjusted as to engage with the vise d when the latter is moved into the position desired, such engagement preventing further movement of the vise toward the drill and forming a stop to which the vise may be adjusted.

When it is desired to set the machine for centering both ends of several pieces of the same length, one of said pieces is placed between the jaws f and g and clamped loosely therein, the plate e and vise being for the time moved away from the drill. The piece to be drilled is adjusted until the center of its length is approximately over the center of the pivot-bolt k . The vise is now moved toward the drill until the end of the clamped piece abuts the gage t . The vise is then revolved to bring the opposite end of the piece into engagement with said gage, and if the two ends of the piece are found to be not equidistant from the center of the vise said piece is moved longitudinally a distance sufficient to make them so. The vise and the work clamped therein are then adjusted on ways a' until the end of the piece again abuts the gage t , and said vise is then clamped in position by partially rotating rod s in the manner described. Having once properly adjusted

the vise, any number of pieces of a given length may be successively clamped and drilled. To simplify this application, I have shown a machine as fitted up with a single drill-spindle. It will be readily seen, however, that the double form of spindle covered by the said earlier patent to David E. Whiton and myself could be as well mounted upon the frame *b* without interfering in the least with the means provided for the ready adjustment of said frame already described, said double form of spindle being also equally operative with the form of work-supporting vise described in this present application.

My described improvements are not complicated. Neither are they expensive to produce and assemble: They add materially to the convenience of adjusting and operating this class of machines and make it possible to produce more work in a given time than has heretofore been possible.

Having described my invention, I claim—

1. In combination with a drill-spindle, work-supporting mechanism revolubly mounted upon a base-plate having at opposite sides beveled offsets *c*¹, a bolt mounted in said work-

supporting mechanism, adapted to engage the said offsets, and an adjustable stop in the path of a radially-projecting part of said work-supporting mechanism, all substantially as specified.

2. In combination, a bed, a carriage mounted to slide thereon, a work-support revolubly mounted on said carriage by means of a central bolt extending through the base of the work-support and through the said carriage and bed, a cross-bar *k*³ on said bolt, and a rock-shaft with flattened circumference as set forth, engaging said cross-bar, substantially as and for the purpose specified.

3. In combination with a drill-spindle and its journal-bearing, a stop-gage consisting of a hinged arm whose free end is cupped and may be swung over said spindle, as set forth, one end wall of said cup being in engagement with, and supported by, the said journal-bearing when in use, substantially as specified.

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