(No Model.) 5 Sheets—Sheet 1.

J. L. BOGERT.

TURRET MACHINE.

No. 551,846. Patented Dec. 24, 1895.

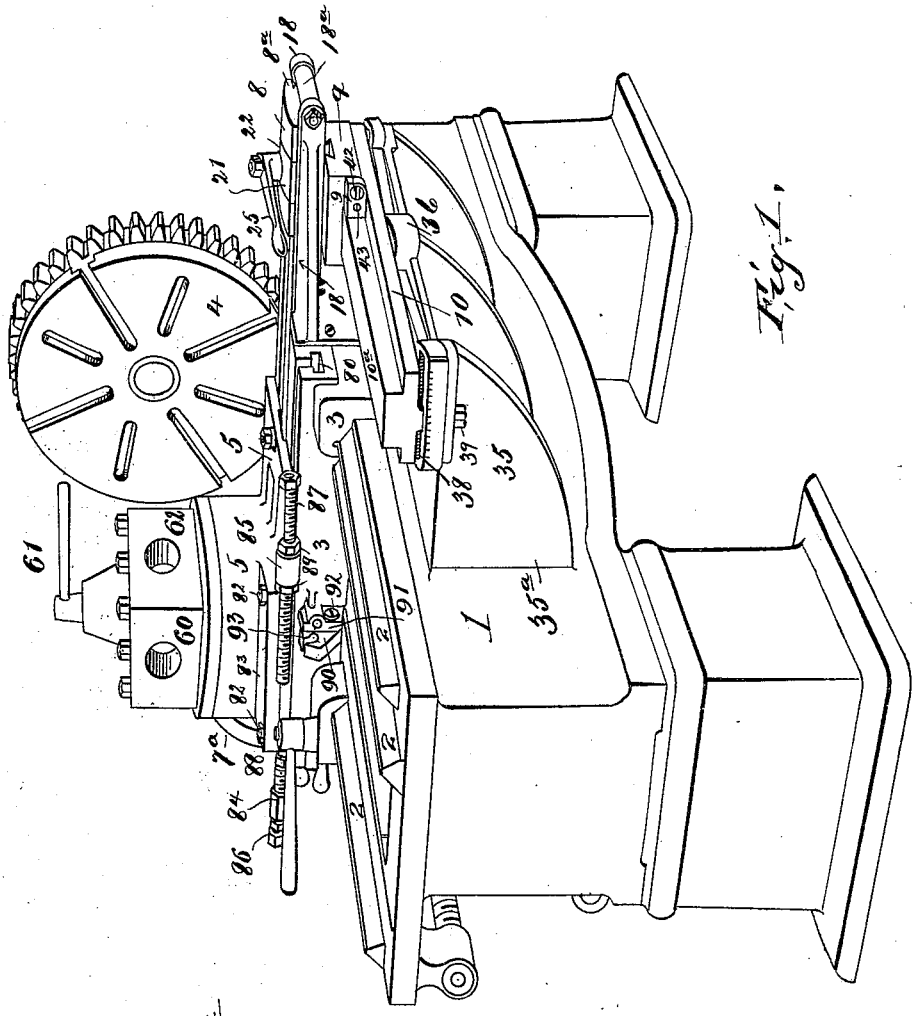


Fig. 1.

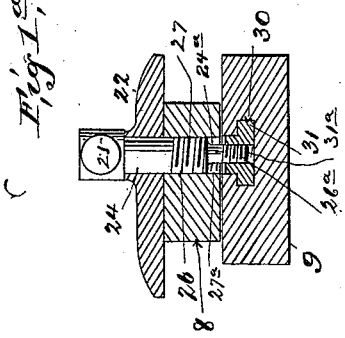


Fig. 1a.

WITNESSES:
C. W. Benjamin
M. F. Boyle

INVENTOR
John L. Bogert
BY
T. A. Bourne
his ATTORNEY

(No Model.) 5 Sheets—Sheet 2.

J. L. BOGERT.

TURRET MACHINE.

No. 551,846. Patented Dec. 24, 1895.

Fig. 2.

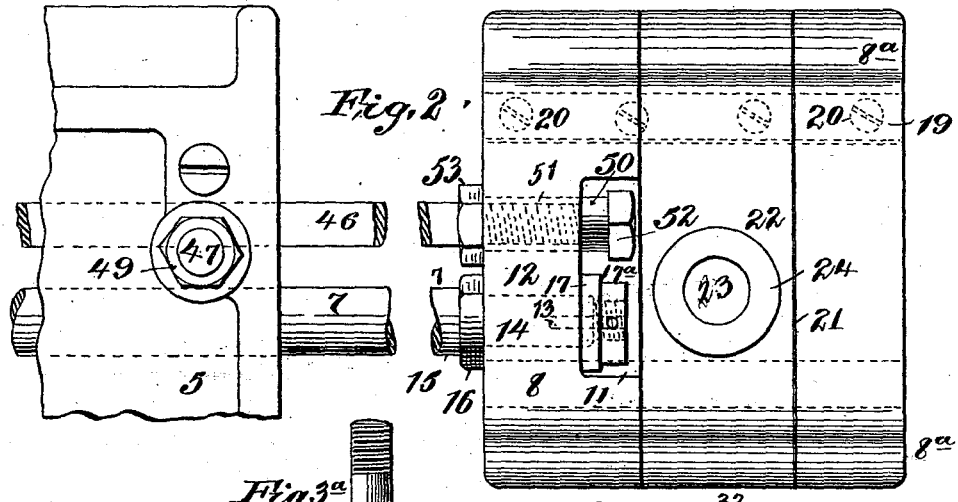


Fig 3a.

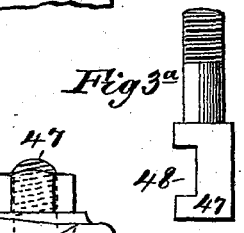
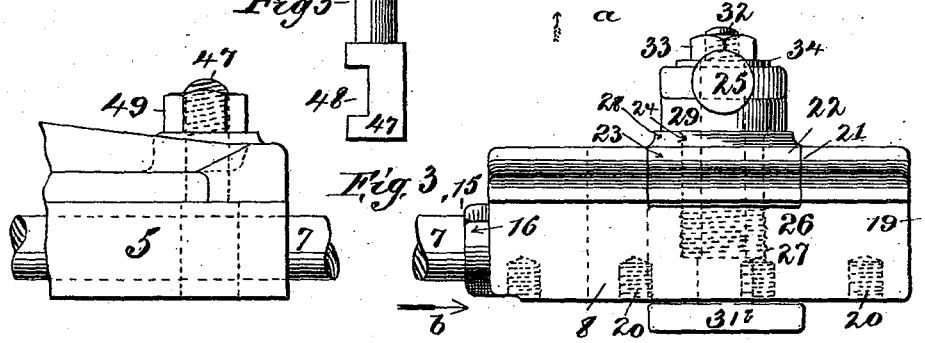


Fig. 3.



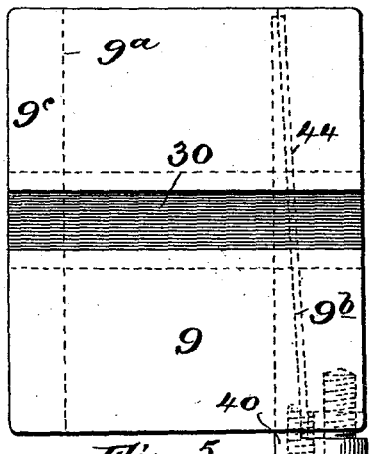


Fig. 5.

Fig. 4.

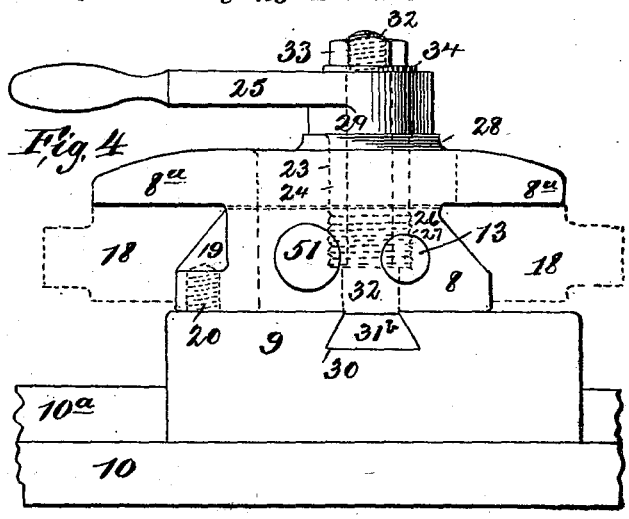
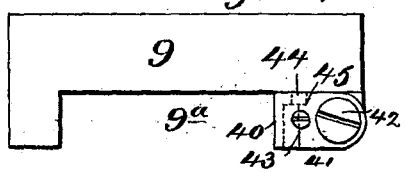


Fig. 6.



WITNESSES:

C. N. Benjamin

M. F. Boyle

INVENTOR

John L. Bogert

BY

F. F. Bourne

his ATTORNEY.

(No Model.)

5 Sheets—Sheet 3.

J. L. BOGERT.

TURRET MACHINE.

No. 551,846. Patented Dec. 24, 1895.

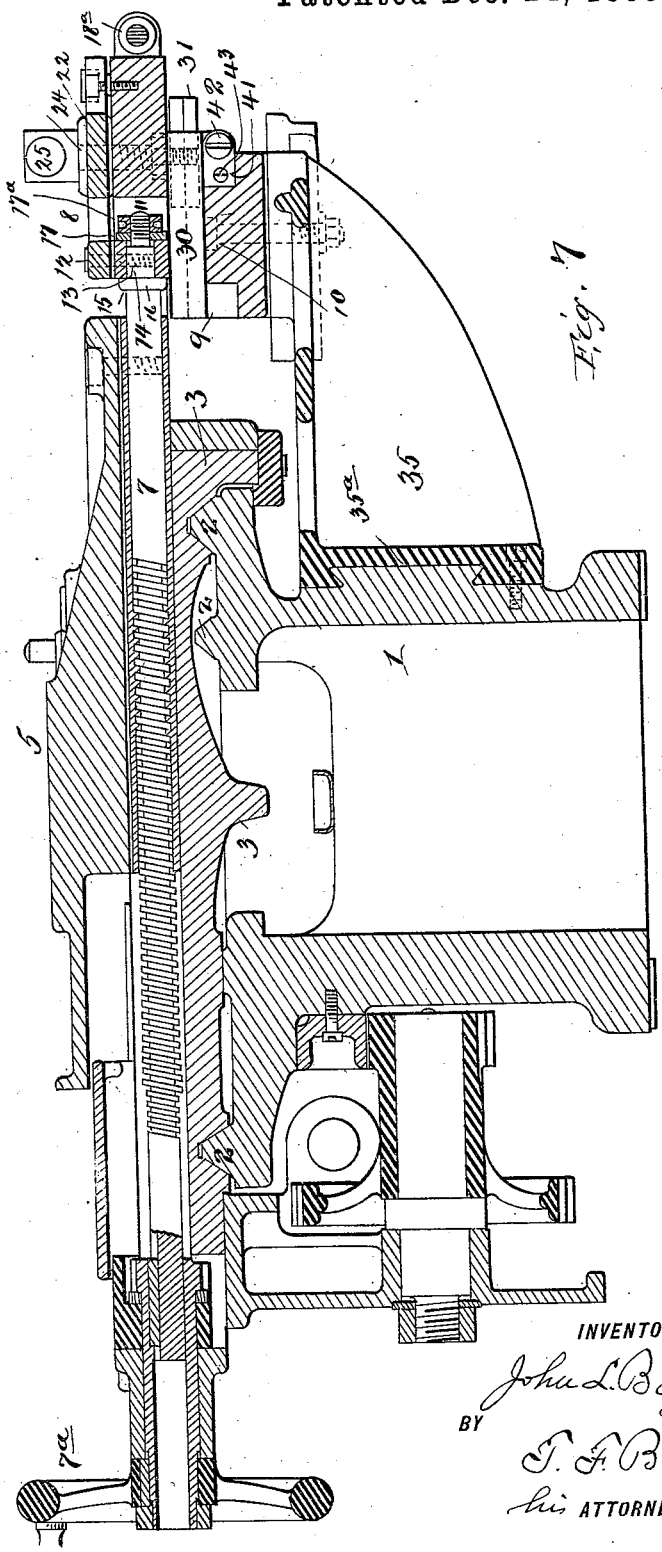


Fig. 1.

WITNESSES:

C. H. Benjamin

M. F. Boyle

INVENTOR

John L. Bogert

BY

F. F. Bourne

his ATTORNEY

(No Model.) 5 Sheets—Sheet 4.

J. L. BOGERT.

TURRET MACHINE.

No. 551,846. Patented Dec. 24, 1895.

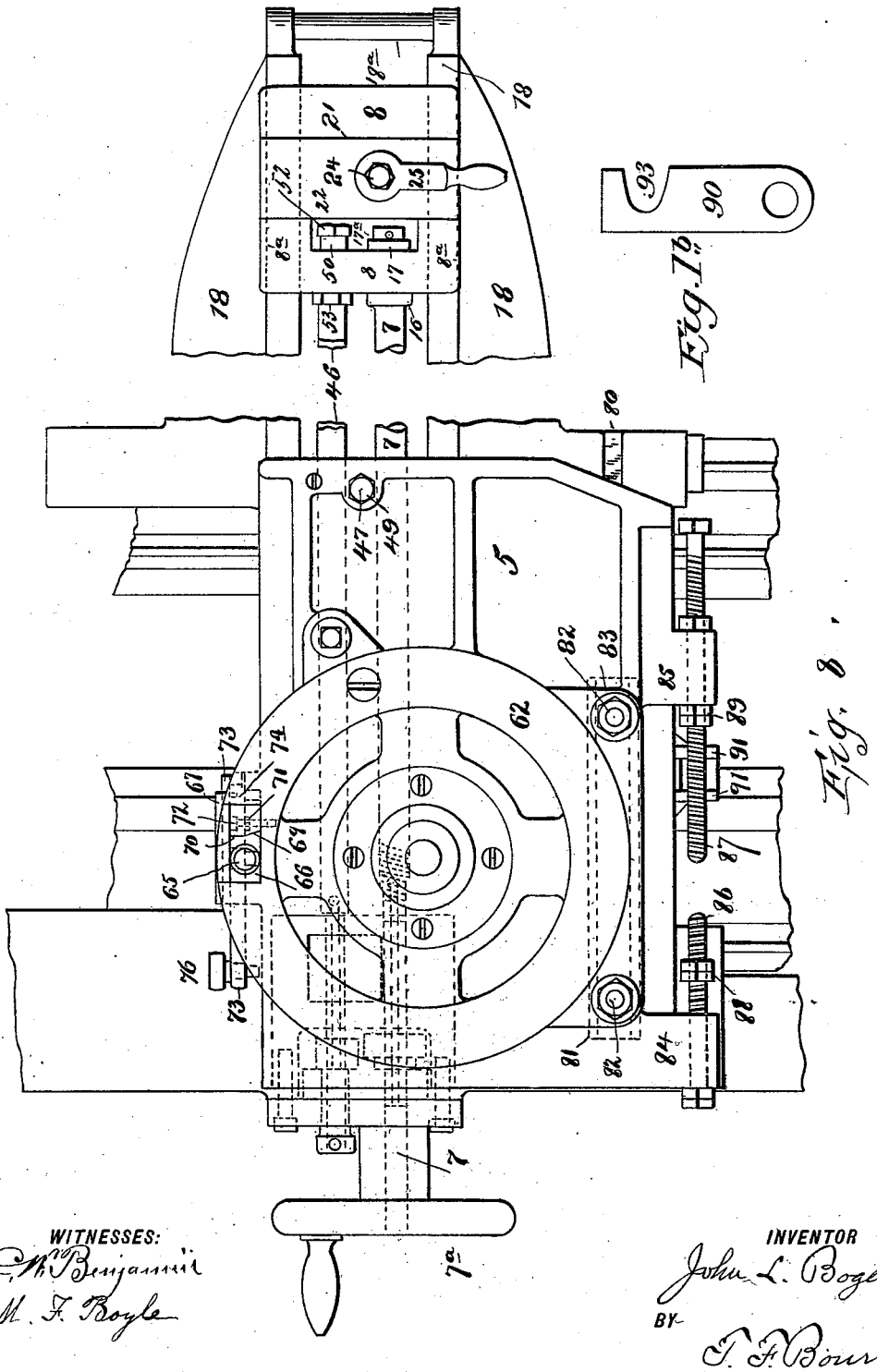


Fig. 8.

Fig. 7b.

WITNESSES:
C. M. Benjamin
M. F. Boyle

INVENTOR
John L. Bogert
BY
T. F. Bourne
his ATTORNEY

(No Model.) 5 Sheets—Sheet 5.

J. L. BOGERT.

TURRET MACHINE.

No. 551,846. Patented Dec. 24, 1895.

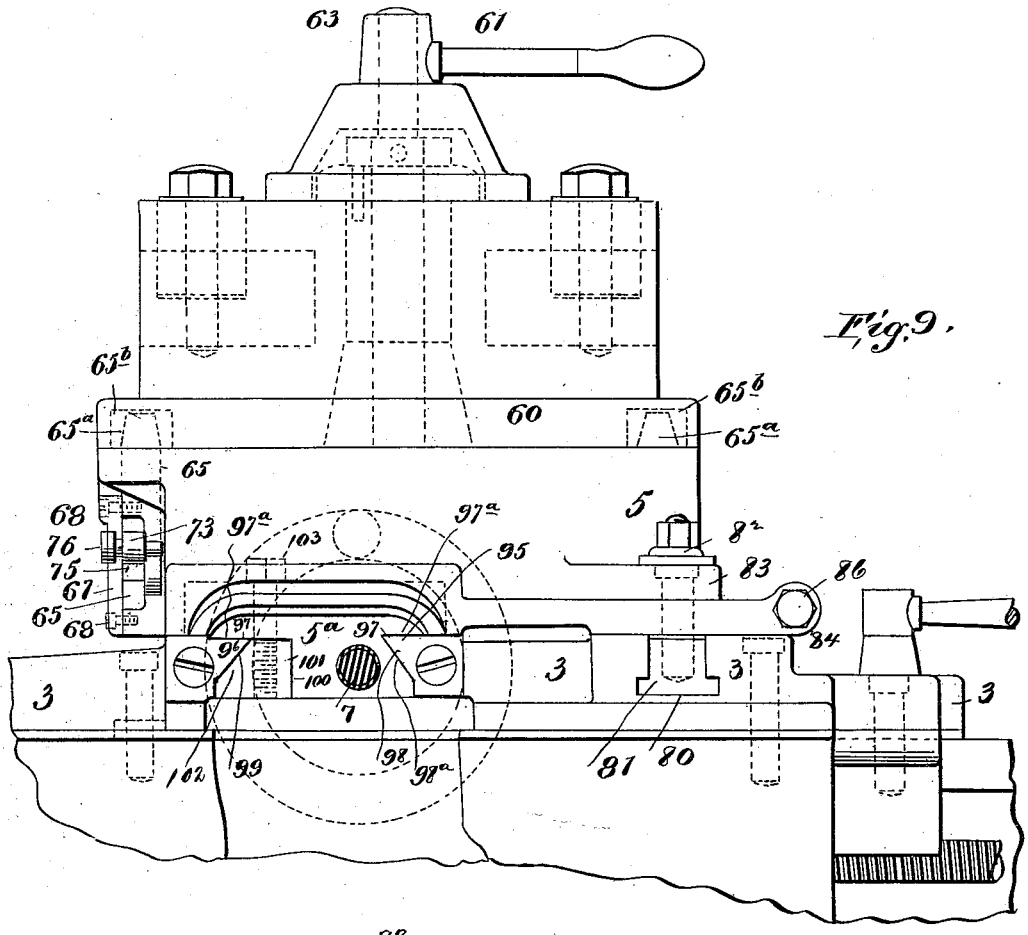


Fig. 9.

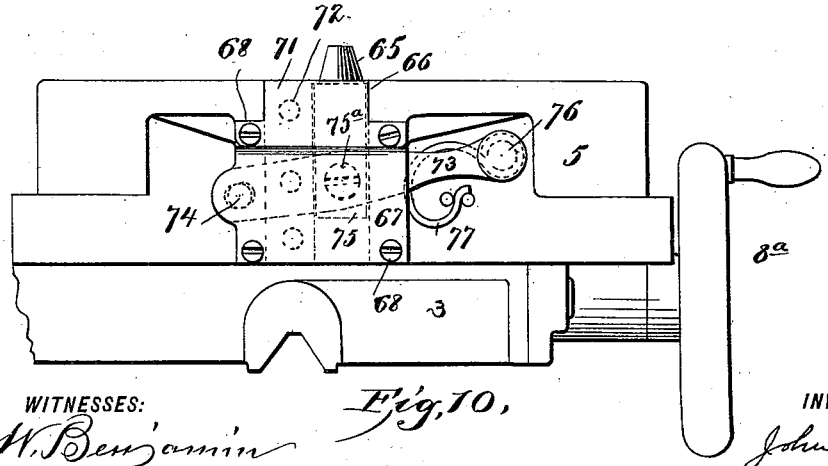


Fig. 10.

WITNESSES:

C. W. Benjamin

M. F. Boyle

INVENTOR

John L. Bogert

BY

F. F. Bourne

his ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN L. BOGERT, OF FLUSHING, NEW YORK.

TURRET-MACHINE.

SPECIFICATION forming part of Letters Patent No. 551,846, dated December 24, 1895.

Application filed April 10, 1895. Serial No. 545,167. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. BOGERT, a resident of Flushing, Queens county, New York, have invented certain new and useful Improvements in Turret-Machines, of which the following is a specification.

My invention relates to certain novel improvements in devices for turning tapers—such, for instance, as the parts in a lathe or similar machine which act to move the cross-slide across the carriage as the latter is being moved toward the work. Means for accomplishing this result are shown in my United States Patent No. 380,785, dated April 10, 1888, wherein a taper-bar, which can be adjusted to the desired angle to the lathe-bed, is used to move the cross-slide across the carriage to cause a tool to cut a taper upon the rotating piece of work. A traveler moves along the taper-bar and is connected with the cross-slide by a pin which passes into a hole in the cross-slide. With this construction, when it is desired to connect the cross-slide with the traveler, it is necessary to so adjust the parts as to cause the holes in the cross-slide and traveler to align to enable said pin to connect said parts. This, of course, requires time and accuracy of adjustment, and one of the objects of my present invention, therefore, is to so improve this class of devices that instantaneous connection can be made between the cross-slide or the taper-slide connected therewith and the traveler in whichever position the parts may be without the necessity of aligning one part with another in order to make the connection. It will be understood, however, that my said improvement may be used in other relations where it is desired to quickly join two parts together, as more fully hereinafter explained. In my said patent the carriage has guide-arms or a "jaw" in which part of the cross-slide moves, but no provision is shown therein to fasten the cross-slide to said guide-arms or jaw at any time. An object, therefore, of my present invention is to enable the cross-slide to be rigidly connected with said guides or jaw when desired. This feature becomes essential in my present invention because the cross-slide, which is shown as carrying a revolving turret or monitor, is to be adjusted across the lathe-bed, and because said slide is connected with the "taper-slide," which latter acts as an anchor at certain times to hold the screw for moving the cross-slide.

One of the peculiar features of my present invention is that the means for holding the taper-slide to the traveler and the means for holding the taper-slide on the guide-arms or jaw are so arranged that when placed in one position one of said effects will take place and when placed in the other position the other effect will be produced. By this means I am enabled by a very simple construction to accomplish some very important improvements in this class of machinery.

In addition to the foregoing my invention embraces means for rigidly connecting the cross-slide with the taper-slide, when desired, and for conveniently taking up wear between several of the parts.

A further portion of my invention relates to important improvements with respect to the manner of holding tools upon the cross-slide, and more especially with reference to holding and operating a tool-carrying turret upon the cross-slide. In carrying out this part of my invention I provide a lock on the cross-slide for holding the revolving turret, which lock is located directly beneath the tool that is presented to the work, and said lock is carried well forward toward the work, so as to hold the turret with increased leverage. On the carriage diametrically opposite said lock is a gib or block, which slides in suitable guides in said carriage, and it is connected with the cross-slide, the connection between said gib or block and the cross-slide being carried well outwardly, so as to afford increased leverage for holding the cross-slide. By this means the strain put upon the tool, when work is being done, is effectively resisted, whereby the tool is held with greater rigidity than in other machines of this class known to me. The said gib or block moves with the cross-slide across the carriage when tapers are being cut, and securely holds the cross-slide on the carriage.

The above-mentioned lock embodies novel details of construction which adapt it for the purposes designed.

I have also provided an improved stop-motion for the cross-slide, by which the desired amount of forward and backward motion of

the cross-slide can be regulated, and whereby the full feeding motion of the cross-slide can be accomplished by a simple adjustment.

I have also provided novel means for firmly holding the cross-slide ways in connection with the corresponding ways on the carriage, so as to resist the end thrust from the tool, and to take up any wear that may occur in said ways, so that the cross-slide will travel accurately at all times.

My invention also consists in the novel details of improvement, and the combinations of parts that will be more fully hereinafter set forth, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part hereof, wherein—

Figure 1 is a perspective view of a turret-machine embodying my improvements. Fig. 1^a is a sectional detail showing the means for clamping the taper-slide to the taper bar or guide as well as holding the taper-slide on the jaw or arms. Fig. 1^b is a detail view of latch 90. Fig. 2 is a detail plan view of the taper-slide and part of the cross-slide. Fig. 3 is an edge view thereof. Fig. 3^a is a detail of a binder-bolt. Fig. 4 is an end view of the taper-slide, showing modified devices for clamping it upon the jaw or arms and for clamping it upon the traveler. Fig. 5 is a plan view of the traveler. Fig. 6 is an edge view thereof. Fig. 7 is a longitudinal sectional view of the machine through the cross-slide and taper-slide, showing the cross-slide feed-screw and its connections with the taper-slide, the turret being removed. Fig. 8 is a partly-broken plan view of the machine with the turret removed. Fig. 9 is a partly-broken face view of a portion of the machine; and Fig. 10 is a side view of a part of the cross-slide, showing the turret-lock.

In the accompanying drawings, in which similar numerals of reference indicate corresponding parts in the several views, the numeral 1 indicates the frame or body of a suitable machine to which my improvements are applicable. 2 are ways or guides on the bed of said frame, and 3 is a carriage mounted to slide on said ways, which may be moved along said ways by any suitable or well-known means. 4 is a face-plate to support the work, which plate or the work may be rotated by any suitable means not necessary to more fully describe here.

The above parts may all be of suitable or well-known construction in this class of machinery.

Mounted in suitable guides on the carriage 3 is a cross-slide 5, of suitable construction, which may carry the tools in any desired manner. In Fig. 1 the cross-slide 5 is shown as carrying a turret or monitor 60, which may be of suitable construction and suitably operated, as it forms no part of my present invention and is merely shown to illustrate the adaptability of my invention to such a machine. The cross-slide 5 is to be moved across the carriage 3 to adjust the tools to the work, and may be moved by a cross-feed screw 7 provided with a hand-wheel 7^a for turning it. As the cross-slide 5 is to be moved across the carriage by the taper devices independently of its movement by the hand-wheel, said wheel should be connected with said screw by means of a feather and spline in well-known manner, so that the screw can move longitudinally within said wheel. (See Fig. 7.)

The cross-feed screw 7 in this invention is connected with what I term a "taper-slide" 8, which is adapted to be connected with a traveler 9, that moves along a taper-bar 10, suitably carried by the frame 1. The taper-slide 8 is shown provided with a recess 11, forming a cross-bar or bridge 12, which is provided with an aperture 13 in which the reduced end 14 of the cross-feed screw 7 is journaled. Said screw has a shoulder 15 between which and the bar 12 a washer or collar 16 lies, and on the end of said screw is a washer 17, that lies in the recess 11 and against the bar 12, a nut 17^a on the screw 7 holding the parts in such position that the screw can rotate while being attached to the taper-slide 8; but, of course, said screw or guide can be otherwise suitably connected for this purpose, if desired.

The taper-slide 8 is adapted to slide between two arms or guides 18 forming a "jaw-shaped" guide carried by and projecting outwardly from the carriage, (see Fig. 1 and dotted lines in Fig. 4,) the outer ends of the arms or guides 18 being preferably tied together by a tie-bolt 18^a to keep them from spreading, substantially as shown in my said patent. The meeting edges of the arms or guides 18 and the taper-slide 8 may be of suitable shape, but I prefer that they form acute angles, as shown in Fig. 4. The taper-slide 8 has outwardly-extending webs 8^a that overlie the arms 18, whereby said taper-slide is supported to slide on said arms. In order to take up wear between the taper-slide 8 and its guiding-arms 18, I may provide a suitable gib 19, that lies between one side of the taper-slide 8 and an arm 18, screws 20 in the slide 8 bearing against said gib, whereby the latter may be adjusted as wear takes place.

To clamp the taper-slide 8 firmly upon the arms or guides 18, and at the same time to release the slide from holding engagement with the traveler, I have provided improved devices which also act to clamp the traveler to the slide 8, while releasing the slide 8 from the arms 18 as the case may be. These devices are of special advantage in this relation, and of course may be used in connection with other mechanism. These improved holding and releasing devices are arranged and operate as follows, as clearly shown in Figs. 1^a and 2:

The slide-block 8 has a cross-recess 21, in which is placed a clamp-bar 22, which extends across said slide 8, and rests at its ends upon the arms 18. The bottom of the recess 21 is beneath the top surface of the arms 18 when the taper-slide is in position (as in full lines in Fig. 3 and dotted lines in Fig. 4) so that said

clamp-bar when pressed upon the arms 18 can act to raise the taper-slide against the arms 18, to clamp the parts together. To accomplish this clamping effect the clamp-bar 22 has a central aperture 23, through which freely passes a rod or shank 24, that is connected with an operating handle or lever 25. The rod 24 is screw-threaded at 26 and works in a tapped recess or hole 27 in the taper slide or block 8. (See Fig. 1ª.)

With the above-described arrangement, when the handle 25 is turned in one direction, say to the right, the screw 26 in the tapped recess 27 will act to move the rod or shank 24 inwardly, thereby clamping the taper-slide 8 to the arms 18, as before explained. When the taper-slide is thus clamped to the arms 18 it acts as an anchor so that when the cross-feed screw 7 is turned the cross-slide can be moved or fed along the carriage 3. When the handle 25 is turned in the opposite direction the taper-slide will be loosened from the arms 18 and will be free to slide along them to move the cross-slide and tools across the carriage for the purpose of cutting tapers. In order to thus move the taper-slide along the arms 18 it is to be clamped or fastened to the traveler 9, and my invention is so arranged and designed that when the handle 25 is turned to clamp the taper-slide 8 upon the arms 18 said slide will be released from the traveler, and when the handle 25 is turned to release the taper-slide from the arms 18 it will be clamped to the traveler 9. Thus a movement of the handle 25 in any direction accomplishes two results. This is effected as follows: Transversely of the traveler 9, in its top, is a groove 30, in which is adapted to fit and slide a gib or block 31, which gib and the groove 30 may be of suitable shape so that said gib may be able to lift the traveler 9 against the slide or block 8. In Fig. 1ª the rod 24 has a reduced end or shank 24ª, which is threaded at 26ª, the threads 26 and 26ª being of different pitch to cause one part to move faster than the other, or said threads may be reversed—that is to say, one right and the other left handed threads. The shank 24ª passes freely through an untapped extension 27ª of the bore 27, and the threads 26ª work in a tapped recess or bore 31ª in the gib or block 31, and thus act to raise or lower the gib or block 31, and the traveler 9 with it, as the case may be. Thus if the rod 24 is turned in one direction the threads 26ª 31ª will act to bind the parts 8 and 9 together, and by a reverse movement the parts 8 and 9 will be released.

By means of the above-described parts I have provided a device wherein by a turn of the rod or screw one of the parts can be clamped to another while being released from still another part, and vice versa. For instance, supposing the rod or screw 24 is turned to the right, (see Fig. 1ª,) the threads 26 27 will act to draw the parts 8 and 22 together, at the same time causing the threads 26ª and 31ª to lower the gib or block 31, and thus push the traveler 9 away from the slide or block 8. When the rod 24 is turned in the reverse direction the threads 26ª 31ª will draw the parts 8 and 9 together and threads 26 27 will push the parts 8 and 22 apart. From the foregoing it will be understood that when these devices are used in connection with the arms 18 18, and it is desired to clamp the taper-slide 8 to the arms 18, the handle 25 will be suitably turned so as to press the parts 22 and 8 against the arms 18 to clamp the taper-slide 8 to said arms. The traveler 9 will thus, by the unscrewing of the threads 26ª 31ª, be released from the taper-slide 8. In this position of the parts the cross-slide 5 will be held immovably on the carriage 3 to enable the tools to be fed with the carriage in straight lines toward the face-plate. The taper-slide 8 when thus fastened to the arms 18 also acts as an anchor for the cross-feed screw 7 to permit the cross-slide 5 to be moved across the latter as desired. When it is desired to cut tapers, the taper-slide 8 is released from the arms 18 to enable it to slide along said arms, and is to be secured to the traveler 9. This double effect is accomplished by turning the screw-rod 24 in the reverse direction to that above mentioned, whereupon the threads 26 27 will act to unclamp the parts 8 and 22 from the arms 18 and the threads 26ª and 31ª will act to draw the traveler 9 against the taper-slide 8 to clamp them together. Now when the carriage 3 is fed along the ways 2 the taper-bar 10, according to the angle to which it is previously set, will cause the traveler 9, as it moves along said bar, to draw the taper-slide 8 and cross-slide 5 along the guide-arms 18, to cause the tool carried by the cross-slide to cut the desired taper on the work.

It will thus be understood that by a single movement of the handle 25 one part is released and another clamped, and vice versa. By this means a great saving of time is effected and accuracy of operation is assured.

It is evident that the arrangement of the rod 24 for clamping one part and releasing another may be changed without departing from my invention.

In Figs. 3 and 4 I have shown a modified arrangement of parts as follows: In this case the rod 24 is in the form of a tube or shank that is carried by the handle 25. This tube or shank 24 has threads 26 at its lower end, working in the tapped recess 27 in the taper-slide 8. The clamp-bar 22 may have a raised circular shoulder 28 against which the head 29 of the handle 25 bears. 32 is a bolt or bar which passes freely through the tube or hollow shank 24 and has a head or block 31ᵇ which enters the groove 30 in the traveler 9. The groove 30 and head 31ᵇ may be of any desired shape that will serve to hold them together while allowing the head 31ᵇ to slide in a groove when required. In Figs. 3 and 4 I have shown an oblong head 31ᵇ, said groove and head having a dovetail shape, as in Fig. 4, so that when the bolt 32 is lifted the trav-

eler will be raised by it. The bolt 32 has a nut 33 which bears on the handle 25 or on an interposed washer 34, whereby said bolt is held in the tube or shank 24. With this arrangement the parts are to be so adjusted (which can be accomplished by the nut 33) that when the handle is turned in one direction the tube or shank 24 will enter the slide 8 to clamp the bar 22 and taper-slide 8 together or to the arms 18, and thus permit the bolt 32 to descend, whereupon the traveler 9 will be released from the taper-slide 8 and the carriage 3 will be free to be adjusted along its ways by its feeding device, as before explained; but when the handle 25 is turned in the reverse direction the tube or shank 24 will rise and release the taper-slide from the arms 18, thereby through the medium of the threads 26 27 lifting the bolt 32, which will thus raise the traveler 9 and clamp it to the taper-slide 8.

The traveler 9 when moved along the taper-bar 10 is designed to draw the cross-slide 5 along the carriage 3, and in order to conveniently accomplish this the taper-bar is shown provided with a central rib or way 10^a, which enters a groove 9^a on the under side of the traveler 9, (see Fig. 6,) by which means the traveler is kept from side movement on the taper-bar and is properly guided thereon. The taper-bar 10 is carried on a bracket 35 secured upon the side of the frame 1, said bracket having a socket 36 in which fits a hub or pivot on the taper-bar 10, whereby the latter is swiveled on said bracket. The bracket 35 may have a dovetail connection 35^a with the frame 1 and be held by screws, or may be otherwise supported on the frame as desired. When the taper-bar lies parallel to the ways 2 the carriage 3 and traveler 9 can move toward and from the face-plate 4 or the work in a line parallel to the axis of the spindle, but when the taper-bar 10 is turned at an angle to the ways 2 the cross-slide 5 will be moved more or less across the carriage 3 as the latter advances along the ways 2, according to the angle between the taper-bar 10 and the ways 2. To hold the taper-bar in the desired position I may provide the bracket 35 with a curved slot 38 in which works a bolt 39 carried by the taper-bar to hold the latter in the desired position. (See Fig. 1.) Graduations may be provided between the taper-bar 10 and the bracket 35 to indicate the amount of angular movement relatively to the ways 2 to which the taper-bar may be moved.

In order to take up wear between the traveler 9 and the taper-bar 10, I may provide the following arrangement: One side wall 9^b of the opening 9^a in the traveler 9 is placed at an angle to the opposite wall 9^c. (See dotted lines in Fig. 5.) 40 is a guide bar or shoe having one edge to lie parallel to the wall 9^c, the opposite edge of said bar 40 being beveled to correspond to the incline of the wall 9^b, the bar or shoe 40 thus being tapered, so that when it is pushed in it will decrease the width of the opening 9^a to take up wear between parts 9 and 10^a. The bar 40 has an offset 41, through which passes a screw 42, that works in the traveler 9 to hold the bar 40 in position, a screw 43 acting to lock the bar, shoe or wedge 40 when adjusted.

In order to keep the bar or shoe 40 in the proper position, regardless of the up or down movement of the traveler 9 imparted by the screw-rod 24, I provide the shoe 40 with a web 44, that rests on a ledge 45 on the traveler 9. (See dotted lines in Fig. 6.) By this means the shoe 40 partakes of all the movements of the traveler. When by means of the screw 24 the parts 8 9 are bound together or released from one another there is a slight movement of part 9 normally, or at right angles, to the upper surface of the guide.

For the purpose of making a rigid connection between the cross-slide 5 and the taper-slide 8, when desired, I provide a stop-rod 46, which may be of rectangular cross-section to keep it from turning or otherwise arranged. This stop-rod 46 passes into a suitable aperture in the cross-slide 5 corresponding to the cross-section of the rod, and may be detachably connected therewith to permit the cross-slide to be fed independently of the taper-slide by any suitable means. For this purpose I have shown in Fig. 3^a a binder in the form of a bolt 47 having a recess 48 in one side to receive and permit the passage of said stop-rod. The binder-bolt 47 is located in a hole in the cross-slide, and has a nut 49 on its threaded end. By this means when the nut is turned in one direction the binder-bolt 47 will press the stop-rod 46 against the walls of its opening in the cross-slide and thus bind said rod firmly to said cross-slide. When the nut is turned in the other direction the binder-bolt will release the stop-rod 46 to permit the cross-slide to move independently. The stop-rod 46 has a movable connection with the taper-slide 8 to permit the cross-slide to have a slight motion independent of the taper-slide 8, and for this purpose as well as to regulate the amount of the said independent movement I provide the stop-rod 46 with an adjustable sleeve 50, that is threaded on a cylindrical end of said stop-rod, and enters an aperture 51 in the cross-bar 12 of the taper-slide 8, wherein it is adapted to have longitudinal movement. The sleeve 50 has a head 52 at one end and a nut 53, which head and nut lie on opposite sides of the bar 12, and act to limit the sliding movement of the sleeve 50. By turning said sleeve on its rod 46 it can be adjusted along the latter to regulate the individual movement of the stop-rod 46.

60 is a turret of suitable construction mounted to rotate on the cross-slide 5 in any well-known or desired manner, and having suitable means to support tools on its several faces.

61 is a handle for securing the turret on the cross-slide in the desired position; but of

course I do not limit my invention to the use of a turret for carrying tools, as they may be carried by the cross-slide in any other desired manner.

62 is a seat on the cross-slide for the turret 60.

The turret 60 rotates around a spindle 63, carried by the cross-slide in well-known manner.

On the side of the cross-slide 5 which directly faces the face-plate 4 I provide a lock to hold the turret 60 in the desired position. This lock is constructed and operates as follows: 65 is a vertically-sliding pin carried in a groove 66 on the side of the cross-slide and held in position by a plate 67 held in front of said pin and secured by screws 68, as shown. The pin 65 has one side beveled at 69, and straight-edged at 70, against which fits a gib 71, having a corresponding beveled and straight-edge part, (see Fig. 8,) which with the groove 66 forms a guide for the pin 65. The gib 71 is adjustably held against the cross-slide and pin 65, as by screws 72, so that it can be adjusted inwardly to cause its beveled edge to fit more or less tightly against the pin 65. By this means the pin 65 can be firmly held in its guides at all times to keep it from tilting, so as to firmly hold the turret, while at the same time permitting the pin to slide to release the turret. The upper end of the pin 65 is preferably tapered, as in Fig. 10, and is adapted to enter sockets or recesses 65^a, of corresponding shape, in the under surface of the turret. (See dotted lines in Fig. 9.) The recesses or sockets 65^a may be formed in hardened-steel bushings 65^b, set in suitable sockets in the turret, as shown in dotted lines in Fig. 9. To operate the pin 65 I have shown a lever 73 pivoted on the cross-slide 5, as at 74, and extending through a recess 75 in the pin 65, and pivotally connected with said pin at 75^a, the lever being located back of the plate 67, and provided at its free end with a knob 76, by which it can be operated to raise or lower the pin 65. 77 is a spring connected with the lever 73 and with the cross-slide 5, and arranged to lift said lever to hold the pin 65 in the recess 65^a of the turret. When turning the turret the lever 73 is first depressed to remove the pin 65 from a recess 65^a in the turret, and when the desired tool is brought into position the lever 73 is released and the pin 65 rises and enters the corresponding socket 65^a in the turret to hold the latter.

The lock-pin 65 is placed well forward of the center of the turret, toward the face-plate, so as to hold the turret close to the tools, whereby the tool is firmly supported close to the rotative work, so that increased steadiness of the tool is effected.

The cross-slide 5 is firmly secured on the carriage 3, directly opposite the lock-pin 65, so as to keep the cross-slide from rising upon the carriage under the strain of the work on the tool, as follows: The carriage 3 has a groove 80 extending from the front to the back of the machine (see Figs. 1 and 9) and in this groove is a gib or block 81 adapted to slide in said groove. The gib or block 81 and the groove 80 are shown in substantially inverted-T form, and said gib is connected with the cross-slide 5 by screws or bolts 82, a ledge 83 on said cross-slide serving to hold said screws. The arrangement is such that when the screws 82 are set up tight the gib 81 will be drawn so that the cross-slide will be firmly connected with the carriage, but when said screws are loosened slightly the gib will be free to slide in the groove 80, yet will act as an anchor to prevent the cross-slide from tilting on the carriage. The gib 81 is located well outwardly from the center of rotation of the turret and therefore affords increased leverage to resist the tilting action of the work on the tools.

To further steady the cross-slide on the carriage and to take up the thrust of the tool I have shown the ways for the cross-slide arranged as follows, (see Fig. 9:) The carriage 3 has two ways 95 96 extending across the machine with a suitable space between them. The ways 95 96 have horizontal tops 97 and downwardly and outwardly diverging sides 98 99, the edges 97 98 and 97 99 forming acute angles. The cross-slide 5 has a block 5^a, which fits between the ways 95 96, the screw 7 working in the block 5^a. The block 5^a has horizontal surfaces 97^a which rest on the surfaces 97 of ways 95 96 and on one side directly beneath bolt 63. The block 5^a has a beveled edge 98^a which matches the edge 98 of way 95, these surfaces 97 97^a 98 98^a making a close fit. The block 5^a on the side adjacent to the way 96 has a right-angled recess 100, in which fits a gib 101 having sides to match the sides of the recess 100, and also a beveled side or edge 102 to bear against the edge 99 of way 96. A space is left between the top of gib 101 and the block 5^a, so that said gib can be drawn upwardly slightly for adjustment. Screws 103 connect the cross-slide with the gib 101 by passing through said block and entering tapped holes in the block 5^a. The arrangement is such that the gib 101 assists in guiding the cross-slide on the ways of the carriage, and by raising said gib the inclined surfaces 99 and 102 act to press the cross-slide back toward the way 95 to cause a firm fit therewith, whereby the cross-slide is held from lifting under the strain of the work on the tools. Any wear that takes place between the cross-slide and the ways on the carriage can be taken up by adjusting the gib 101. The above-described arrangement for the cross-slide is located beneath the pivotal center of the turret which holds the cross-slide firmly in its center, and this in connection with the gib 81, which is placed at a distance sidewise from the block 5^a, serves to produce a very secure attachment between the cross-slide and the carriage. By this means accuracy of the operations of the

machine is enhanced, as the adjustability of the gib 81 permits a close fit between the cross-slide and the carriage to be maintained.

In Figs. 1 and 8 my improved cross-slide stop-motion is shown, and it is arranged as follows: The cross-slide on one side has lugs 84 85 placed at a distance apart in the line of feed of the cross-slide. In these lugs are fitted adjusting-screws 86 87, adapted to be adjusted toward and from each other to leave a space between them. (See Fig. 8.) The screws 86 87 may be firmly held in the desired positions by jam-nuts 88 89, or otherwise, as desired. 90 is a latch pivotally carried by the carriage 3, and it is shown located between jaws 91, which may be squeezed together by a screw or bolt 92 to frictionally hold the latch 90. The latch 90 is so located that when swung downwardly it leaves the cross-slide free to travel to any desired extent, but when the latch is swung upwardly between the ends of the screws 86 87 their ends will abut against said latch and thus limit the feeding movement of the cross-slide, which feeding can be regulated by adjusting the screws 86 87. The latch 90 is also shown provided with a recess 93, so arranged that it can be swung over a screw 86 or 87, so as to permit said screw to slide in said recess. With this arrangement the nuts 88 and 89 can be adjusted in pairs on opposite sides of the latch, and as the corresponding screw 86 or 87 slides in the recess 93 of the latch 90 the nuts will encounter said latch and limit the feeding of the cross-slide in accordance with the positions of the nuts.

In Figs. 7 and 9 I have shown a telescoping shield located over the feed-screw 7 and stop-rod 46 to prevent chips from reaching them. This shield is fully shown and explained in my Patent No. 380,785, to which I refer for a more detailed description, the device being merely shown here to illustrate its connection with the machine to which my improvements are shown applied.

While I have described my improvements as applied to a lathe it is evident that some of them can be utilized in other classes of machines, and furthermore I desire it to be understood that changes may be made in the details of construction without departing from the spirit of my invention.

Having now described my invention, what I claim is—

1. The combination of a carriage having arms or a jaw, with a cross slide, a taper slide connected therewith, a traveler, and means arranged to connect said taper slide with the carriage while simultaneously releasing it from the traveler, and vice versa, substantially as described.

2. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide on said arms a traveler and a taper guide therefor, and a clamping device having a bolt so arranged that when it is turned in one direction it will clamp the taper slide upon the arms or jaw, while releasing the traveler, substantially as described.

3. The combination of a carriage having arms or a jaw, and a cross slide, with a taper slide, a cross feed screw and a stop rod connecting the cross slide with the taper slide, a traveler and a guide therefor and means for connecting the taper slide with said arms or jaw while releasing it from the traveler, and also arranged to connect the taper slide with the traveler while releasing it from said arms or jaw, substantially as described.

4. The combination of a carriage having arms or a jaw, and a cross slide, with a taper slide carried by said arms or jaw and connected with the cross slide, and a traveler, said taper slide having a clamp bar to bear on said arms or slide, and a bolt passing through said taper slide and clamp bar and having a gib or head engaging the traveler, said bolt and taper slide having threads arranged to clamp the taper slide and its clamp bar upon the arms or jaw, while releasing the traveler, and vice versa, substantially as described.

5. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide having outwardly extending webs to rest on said arms or jaw, means for connecting said cross slide with said taper slide so as to permit the cross slide to be adjusted toward and from said taper slide, a clamp bar on said taper slide, a traveler, and a taper-guide therefor, and a bolt having threads arranged to clamp the taper slide and the clamp bar upon the arms or jaw while releasing the traveler, and vice versa, substantially as described.

6. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide supported by said arms or jaw and connected with said cross slide, a clamp bar on said taper slide, a bolt passing through said bar and threaded in said taper slide, a traveler having a block or gib provided with threads to receive another set of threads on said bolt, the two sets of threads on said bolt being arranged to move the clamp bar and block so as to clamp the taper slide on said arms or jaw while releasing the traveler from the taper slide, and vice versa, substantially as described.

7. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide supported by said arms or jaw and connected with said cross slide, a clamp bar on said taper slide, a bolt passing through said bar and threaded in said taper slide, a traveler having a groove in its top, a block or gib arranged to slide in said groove, said block or gib having a threaded hole to receive another set of threads on said bolt, the two sets of threads on said bolt being arranged to move said block or gib away from the taper slide while moving the clamp bar toward it, and vice versa, substantially as described.

8. The combination of a block, a clamp bar

thereon, a bolt passing through said bar and threaded in said block, with another block having a threaded hole to receive other threads on said bolt, whereby as said bolt is turned one part will be moved toward the first mentioned block while the other part is moved away from it, substantially as described.

9. A clamp consisting of three bodies placed together, a bolt passing into or through said parts and arranged to press one body toward the central one while moving the other body away therefrom, substantially as described.

10. A clamp consisting of a central body 8, a bar 22 thereon, a block or gib 31 on the opposite side thereof and another block 9 connected with the block 8 and a bolt having different sets of threads, one set working in the block 8, the other set working in the block 31, said threads being arranged to move the bar 22 toward the block 8 while moving the blocks 31 and 9 away therefrom, and vice versa, substantially as described.

11. A clamp consisting of a block, a bar thereon, a threaded shank passing through said bar and working in threads in said block, and a bolt having a head and a block receiving said head, the bolt being so connected with said shank that they can move longitudinally together, as and for the purposes specified.

12. The combination of a carriage, having arms or a jaw, and a cross slide, with a taper slide, means for connecting the taper slide with said arms or jaw, a cross feed screw connecting the cross slide with the taper slide, and a stop rod also connecting the cross slide and taper slide, the stop rod having independent movement relatively to the taper slide, substantially as described.

13. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide, means for connecting the taper slide with said arms or jaw, a cross feed screw connecting the cross slide with the taper slide, and a stop rod also connecting the cross slide and taper slide, the stop rod having independent movement relatively to the taper slide, and means for adjusting the amount of independent movement allowed said stop rod, substantially as described.

14. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide, means for connecting the taper slide with said arms or jaw, a cross feed screw connecting the cross slide with the taper slide and a stop rod also connecting the cross slide and taper slide, and a sleeve adjustably connected with said stop rod and having a head, said sleeve having independent movement in connection with the taper slide, substantially as described.

15. The combination of a carriage having arms or a jaw and a cross slide, with a taper slide having an opening 11^a and a bar 12, means for clamping the taper slide on said arms or jaw, a cross feed screw connecting the cross slide with the taper slide, and a stop rod extending from the cross slide to the taper slide and having a movable connection with the bar 12 thereof, substantially as described.

16. The combination of a carriage having arms or a jaw and a cross slide with a taper slide, a cross feed screw and stop rod connecting the cross slide with the taper slide and a binder arranged to rigidly connect the stop rod with the cross slide, substantially as described.

17. The combination of a guide or way with a traveler having a groove to receive said way, so that said traveler can move normally to the upper surface of the guide, one side of said groove being beveled or tapered, and with a bar or shoe fitting in said groove and having one side straight and the opposite side beveled or tapered to lie against the corresponding side of said groove, means for holding said bar or shoe in said groove, a ledge at the beveled side of said groove, and a ledge or web on the beveled side of said bar to rest on the first mentioned ledge to sustain the said bar or shoe during the various movements of said traveler, substantially as described.

18. The combination of a cross slide, and a turret thereon, with a vertically movable lock pin carried in guides on said cross slide and arranged to enter a recess in said turret, said pin having a recess on one side, a lever pivoted on said cross slide and passing through said recess and connected with said pin, a plate over said pin, means to operate said lever, and means for taking up sliding-wear between the pin and its guide, as and for the purposes specified.

19. The combination of a cross slide with a turret mounted thereon, a groove in the side of said turret, a lock pin in said groove arranged to hold said turret, said pin having a bevel on one side, a gib in said groove having a bevel on one side to engage the bevel of said pin, means for adjusting said gib toward and from said pin, a plate over said pin and gib, and means for operating said pin, substantially as described.

20. The combination of a carriage, a cross slide and a turret thereon, with a lock pin carried by the cross slide beneath the tool holding socket of the turret, and means on the other side of said cross slide diametrically opposite said pin for holding the cross slide firmly on the carriage, substantially as described.

21. The combination of a bed having ways, a carriage having guide ways and means to feed said carriage, with a cross slide guided thereon, two oppositely disposed adjustable stop rods carried by said carriage and having a space between their inner ends, and a latch carried by the carriage and arranged to be placed in the path of said stop rods to regulate the feed of the cross slide along said carriage, substantially as described.

22. The combination of a carriage with a cross slide thereon, two oppositely disposed adjustable screw rods carried thereby and having nuts adjustable lengthwise of said

rods, and a latch carried by the carriage and arranged to be placed in the path of said rods, said latch having a recess to receive said rods so that they may travel therethrough so that the nuts on said rods may encounter said latch to limit the movement of said cross slide, substantially as described.

23. The combination of a carriage with a cross slide thereon, two oppositely disposed adjustable screw rods carried thereby and having nuts adjustable lengthwise of said rods, and a latch carried by the carriage and arranged to be placed in the path of said rods, said latch having a recess to receive said rods so that they may travel therethrough so that the nuts on said rod may encounter said latch to limit the movement of said cross slide, said carriage having jaws between which said latch lies, and a bolt or screw passing through said latch and carried by said jaws to cause said jaws to grasp said latch, substantially as described.

24. The combination of a carriage having cross ways which are beveled downwardly and outwardly, with a cross slide having a block one edge of which is beveled to correspond with one of said beveled ways the opposite side of said block having a vertical edge, and a gib having one side vertical to engage the vertical side of said block, the opposite side of said gib being beveled to correspond with the other beveled way, screws to draw said gib toward the block to make a close fit between the block and its ways on the carriage, and a cross feed screw for the cross slide journaled in said block, and an anchor for holding said screw to permit it to feed the cross slide, substantially as described.

25. The combination of a carriage, a turret mounted on a cross slide, ways on the carriage for guiding said cross slide, one of said ways being beneath the pivotal center of said turret, a locking device carried by said cross slide on the side toward the work for holding the turret, and a gib carried in ways on the carriage diametrically opposite said lock pin, and means for connecting said gib with said cross slide, substantially as set forth.

In testimony that I claim the invention above set forth I affix my signature in presence of two witnesses.

JOHN L. BOGERT.

Witnesses:
T. F. BOURNE,
M. F. BOYLE.