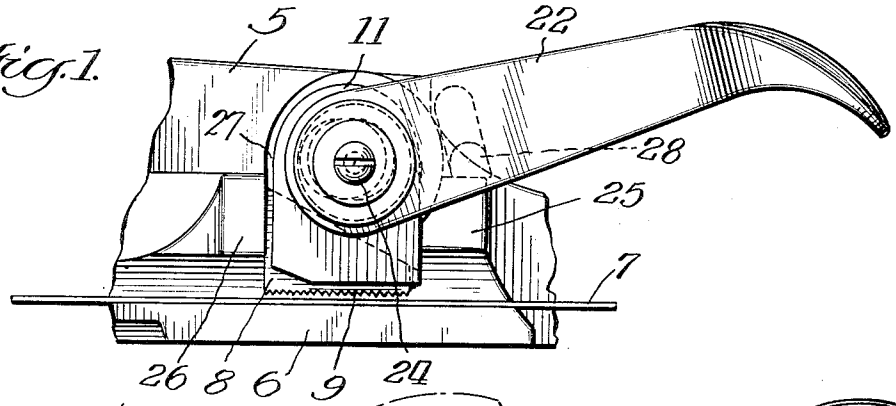
July 11, 1933. H. C. PORTER 1,917,663

GRIPPER

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Fig. 1.



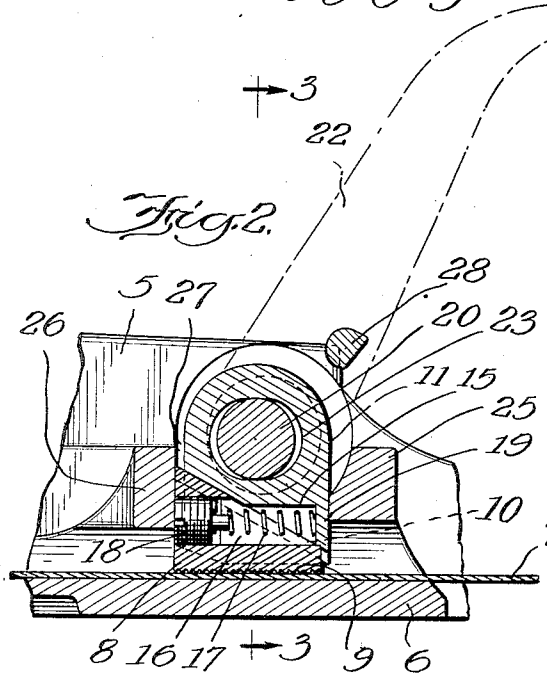


Fig. 2.

Fig. 3.

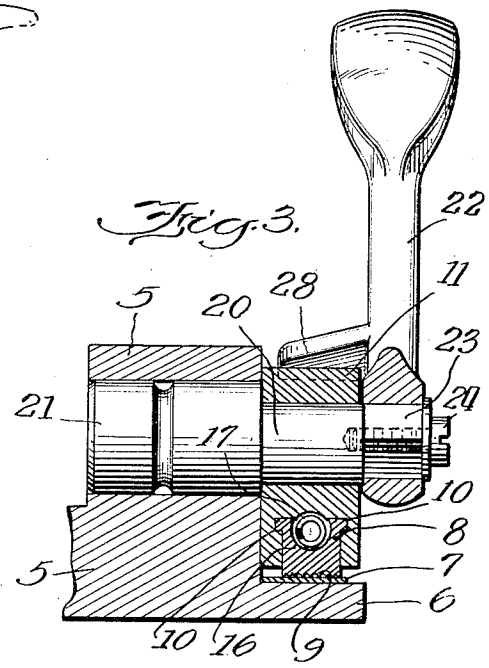


Fig. 4.

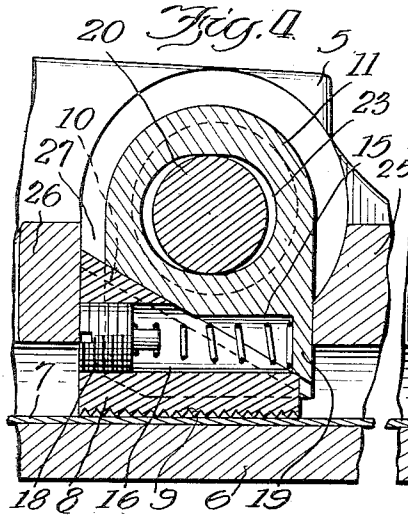
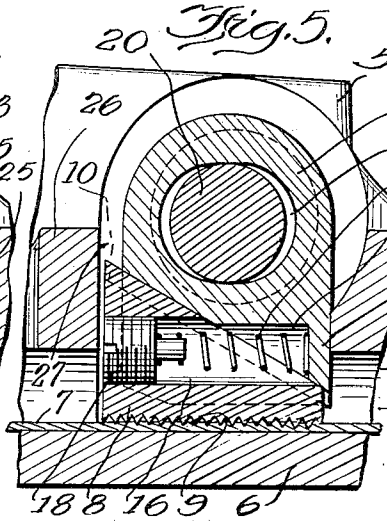


Fig. 5.



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GRIPPER

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Fig. 6.

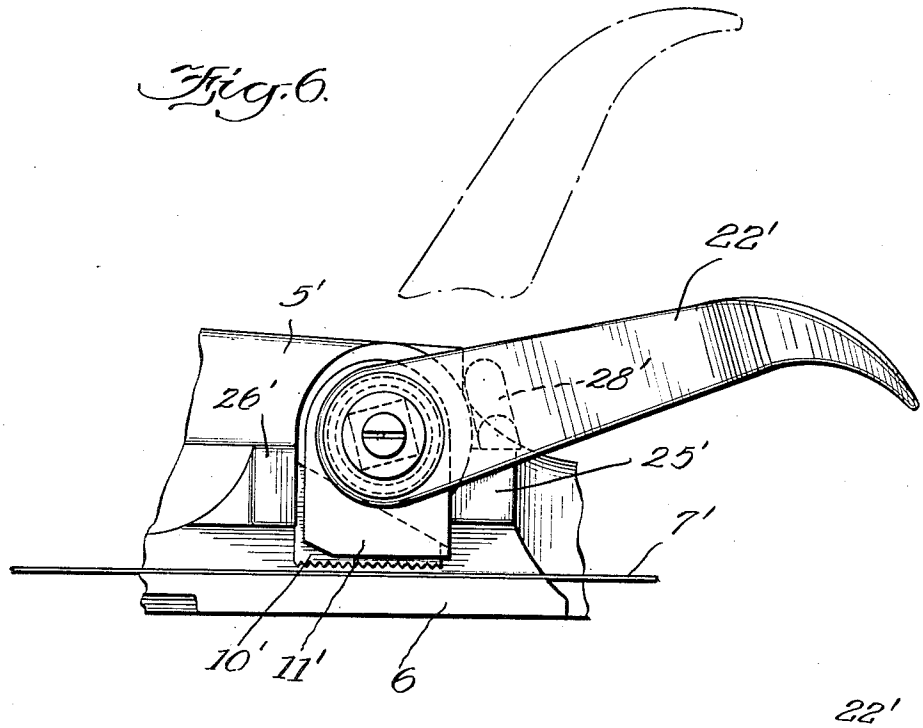


Fig. 7.

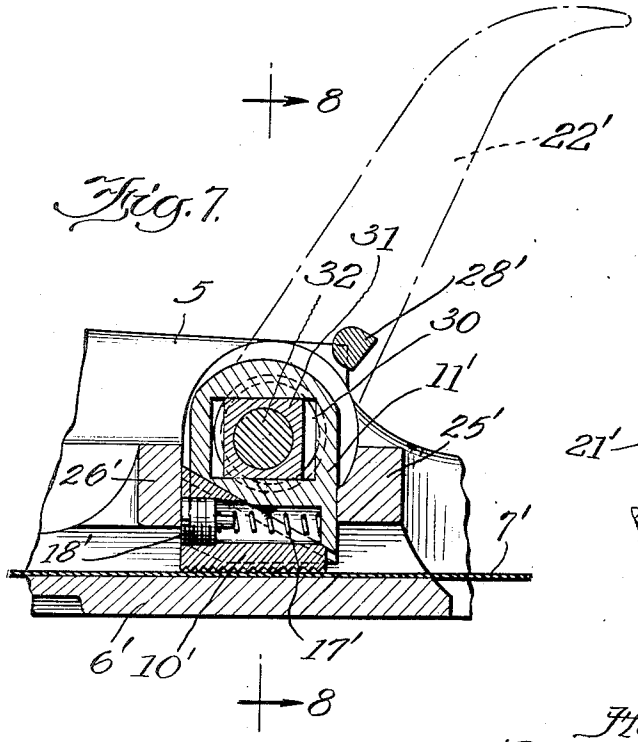
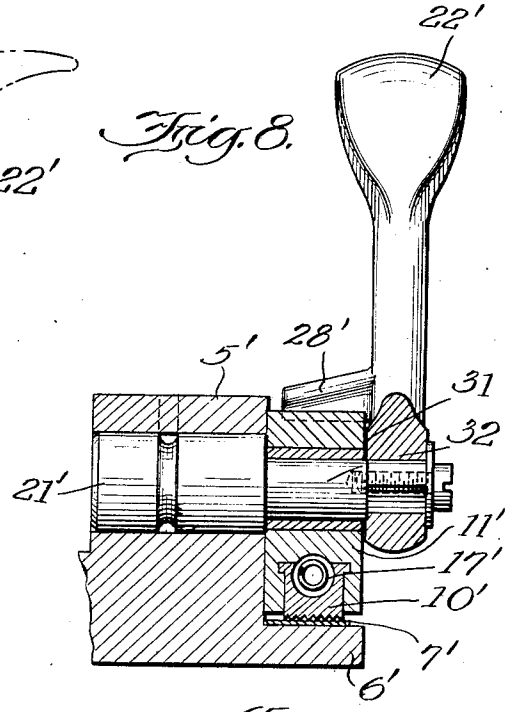


Fig. 8.



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GRIPPER

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Fig. 9.

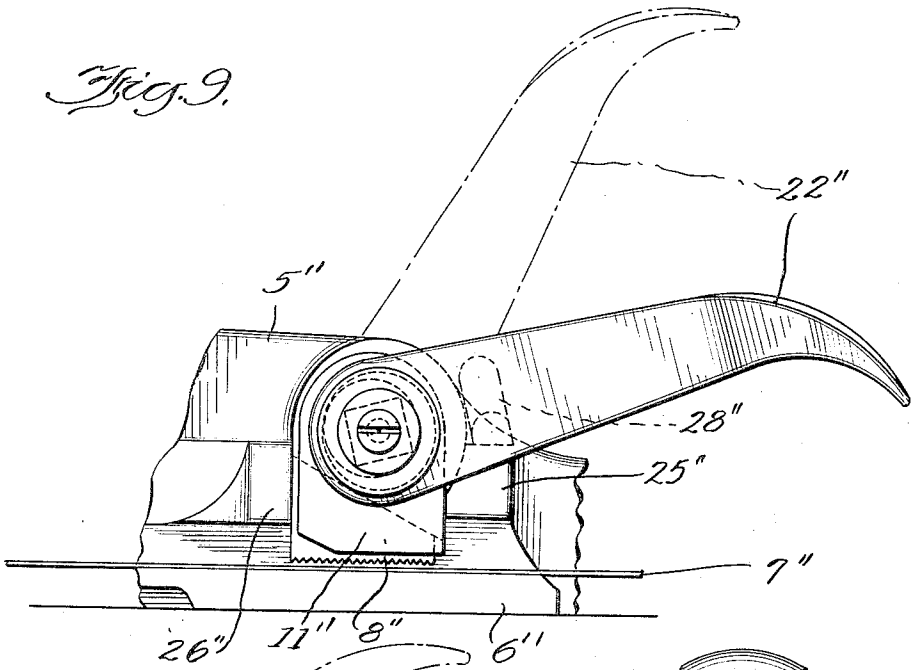


Fig. 10.

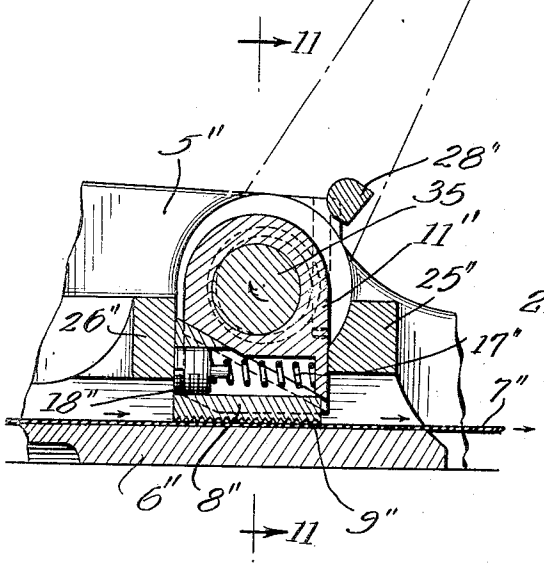
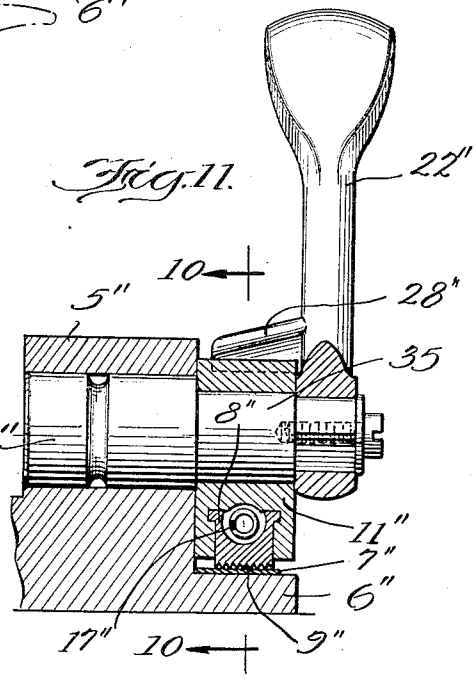


Fig. 11.



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Patented July 11, 1933 1,917,663

UNITED STATES PATENT OFFICE

HOWARD C. PORTER, OF LA GRANGE PARK, ILLINOIS, ASSIGNOR TO SIGNODE STEEL STRAPPING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF DELAWARE

GRIPPER

Application filed July 14, 1932. Serial No. 622,439.

My invention relates to grippers.

More particularly it relates to and will be illustrated and described as embodied in a gripper especially adapted for use in gripping and holding a binder for packages and the like, such as steel strap or wire. Such grippers are particularly useful in binder tensioning or stretching tools and machines employed in the strapping or binding of packages or groups of packages. Examples of such tools are illustrated in Sidney W. Treat Patent No. 1,762,535 granted June 10, 1930 and the copending application of Emil G. Seagren, Serial No. 614,429 filed May 31, 1932.

One of the objects of my invention is to provide an improved gripper.

A further object is to provide a gripper which will be equally effective when used with binders of different thickness.

Another object is to provide a gripper which will not objectionably mar or weaken the binder material held by it.

Another object is to provide a gripper which will so distribute its action over a considerable area of the binder that in the event grip increasing teeth are employed they need not unduly bite into the binder to insure a firm hold thereupon.

Another object is to provide a gripper which will take a firm hold upon the binder although requiring little manual effort to insure proper action.

Another object is to provide an improved gripper which will automatically increase its gripping action in accordance with the increase of tension or pull upon the binder held thereby.

Another object is to provide a gripper which may be easily disengaged from the binder even though the binder is under tension.

Another object is to provide a gripper which will not damage the binder when disengaged therefrom, even though the binder is under tension.

Other objects and advantages will hereinafter appear.

Embodiments of the invention are illustrated in the accompanying drawings, wherein

Fig. 1 is a side elevation of a part of a tensioning tool provided with one form of gripper mechanism embodying my invention, the gripper being in binder receiving position.

Fig. 2 is a vertical section through the mechanism, the gripper being in operative or holding position.

Fig. 3 is a section on the line 3—3 of Fig. 2.

Figs. 4 and 5 are enlarged vertical sections through the gripper, illustrating how the grip upon the binder increases automatically as the tension or pull of the binder increases.

Fig. 6 is a view, similar to Fig. 1, of a modified construction.

Fig. 7 is a vertical section of the modified gripper shown in Fig. 6.

Fig. 8 is a section on the line 8—8 of Fig. 7.

Figs. 9, 10 and 11 are similar views of another modified construction.

Referring first to Figs. 1 to 5, the frame 5 of the tensioning tool is shown provided with a forwardly extending foot 6. This foot 6 forms the stationary member over which the binder 7 passes and against which the binder is clamped in the gripping operation. The complementary movable member of the gripper comprises a wedge shaped gripper block 8 which to increase its holding power is preferably provided with teeth 9 for biting into and securing a firmer hold upon the binder. The toothed or active face of the gripper block is flat and always lies parallel to the binder surface it engages. The opposite side of the gripper block is inclined downwardly in the direction of the binder tension, i. e., in the direction of the arrows, to give it its wedge shape and action. The sloping upper edges of the gripper block project laterally to form a pair of keys 10.

The gripper block is carried by a movable mounting block 11 which is provided with a longitudinal tapered slot for receiving the gripper block. The upper part of this slot is formed into a pair of keyways which slidingly receive keys 10, as most clearly illus-

trated in Fig. 3, whereby the gripper block is retained by and movable vertically with the mounting block and also is capable of movement independently of its mounting block. The sloping wall forming the top of the tapering slot in the mounting block has a socket 15, which may be of cylindrical shape, formed therein in communication with the slot. Socket 15 aligns with a cylindrical bore 16 in the inclined inner face of the gripper block and forms therewith a chamber for a helical spring 17. A threaded plug 18 screws into the threaded end of bore 16 so that when the mounting and gripper blocks and spring are assembled the spring, which abuts the rear wall 19 of socket 15 at one end and the plug 18 in the bore of the gripper block at the other end, biases the relatively movable gripper block toward the left, as viewed in Figs. 1, 2, 4 and 5. The spring also holds the gripper block-gripper mounting assembly together because it will not permit the socket 15 and bore 16 to get far enough out of alignment to permit separation.

The gripper mounting block is loosely mounted upon an eccentric portion 20 of a shaft 21 which shaft is rotatably carried by the tool frame in any desired manner. An operating handle 22 is rigidly attached to a concentric extremity 23 of shaft 21. This attachment may be provided by making the shaft end 23 square and providing handle 22 with a square socket to fit,—a screw 24 serving to hold the two together. Thus by providing the mounting block with a slightly elongated hole 23 to fit upon the cylindrical but eccentric portion 20 of shaft 21, the oscillation of the shaft will elevate and lower the gripper block. As clearly illustrated in the drawings, rotation of handle 22 in a counter-clockwise direction (i. e., elevating its outer end) rotates shaft 21 so as to lower the mounting block to bring the gripper block into engagement with the upper surface of the binder. Movement of the gripper handle in the reverse direction (i. e., to the position shown in Fig. 1) elevates the mounting block so as to raise the gripper block from the binder and open the gripper for the reception of a binder between the gripper block and the foot of the tool.

Guide lug 25 projecting from the frame of the tool engages the rear or right hand side of the mounting block to prevent the same from rotating either in its up and down movements or when subjected to the strain of binder tension. A similar guide lug 26 lies in front or to the left of the mounting block but spaced therefrom by a narrow clearance gap 27. However, the biasing spring 17 tends to retain the movable gripper block in contact with this guide lug 26 and also to retain the mounting block against guide lug 25. A projection 28 carried by the gripper control handle 22 engages guide lug 25 to limit the downward movement of the handle.

In operation the gripper control handle 22 of the tool is moved downwardly until its stop projection 28 engages lug 25, as shown in Fig. 1, to open the gripper for the reception of the binder. The binder is placed between the gripper block and the foot of the tool and then the controlling handle is moved upwardly or counter-clockwise until the gripper block firmly engages the upper surface of the binder, as shown by the dotted lines of Fig. 2. In this condition the movable gripper block is, under the influence of its biasing spring, held against guide block 26, as shown in Figs. 2 and 4. Now as the tension upon the binder increases in the direction of the arrows (i. e., toward the left as viewed in all figures) the movable gripper block is by that tension caused to move toward the right. And because the mounting block is held rigid the wedge action causes the gripper block to move downwardly into tighter and tighter engagement with the binder as the binder tension pulls the gripper block toward the right. This wedging action causes the gripper block to embed its teeth more firmly into the binder and increase the grip thereupon. It thus insures that the binder will be firmly held even though the initial grip is slight and consequently very little effort needs to be exerted on the control handle in order to insure proper action.

Because of the fact that the gripping surface of the gripper block remains parallel to the plane of the binder and is provided with a relatively extensive gripping face, it is unnecessary that the teeth indent the binder very deeply in order to secure and maintain a firm hold thereupon and consequently the binder is not unduly marred or weakened.

In order to release the binder the controlling handle is again moved to the down position shown in Fig. 1. This release of the binder can be accomplished easily even though the binder is under tension, because the movement of the gripper mounting block being vertical lifts the teeth of the gripper block straight out of the indentations they have made in the upper surface of the binder.

Release of the gripper is also assisted by the wedging action of the gripper block. Thus this wedging action is always tending to raise the supporting block; but during the time the gripper is in action this tendency is resisted by the eccentric connection between the mounting block and the shaft and the friction of the bearings. But when this resistance or opposition is almost wholly removed with the rotation of the shaft to raise the mounting block the wedging action of the gripper assists in the elevation of the mounting block. Consequently the effort required to release the gripper, even when the binder

is under severe tension, is extremely small,—in effect being only that required to overcome the friction between the shaft and its bearings and between the shaft and the mounting block. Furthermore, as the teeth are being elevated out of the indentations in the binder the stretch of the strap cannot cause relative movement between the binder and the teeth of the gripper block. Such movement, which was characteristic in prior grippers, resulted in the binder surface being cut or scored by the gripper teeth. The elimination of this undesirable relative movement is brought about by the fact that, as the binder moves toward the right when the grip is released, the gripper block is free to follow except for the relatively slight opposition afforded by spring 17. This movement of the gripper block with the binder enables the teeth to be lifted out of the indentations in the binder with little effort and without danger of scoring the binder. When the mounting block has been elevated sufficiently completely to withdraw the gripper block teeth from the binder impressions, spring 17 returns the gripper block to its initial position against guide 26.

A variety of other arangements may be employed to produce the movements of the mounting block perpendicularly to the stationary gripping member whereby the movable gripper is moved toward and from the binder.

Figs. 6 to 8 show one modification wherein the mounting block 11′ is provided with a rectangular opening 30 in which is slidably mounted a rectangular cross head 31. Cross head 31 is journalled upon an eccentric portion 32 of a shaft 21′ carried by the frame. Mounting block 11′ carries a wedge shaped gripper block 10′, which cooperates with a stationary gripping member 6′ to hold a binder 7′, and is moved toward and from the stationary member by a handle 22′. The operation of this modified construction corresponds essentially with that heretofore described.

Figs. 9 to 11 show another modified construction for translating slight rotary movements of the control lever shaft into rectilinear movements of the mounting block perpendicularly to the stationary gripping member. This arrangement may be employed when only slight vertical movements of the mounting block are required to bring the movable gripper block into and out of operative position. In this construction the mounting block 11″ is journalled upon an eccentric portion 35 of the control lever shaft 21″. The action of this modified construction is essentially the same as heretofore described.

Having thus described the nature and several embodiments of my invention, what I claim and desire to secure by United States Letters Patent is as follows:

1. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a wedge shaped movable member to engage the opposite side of the binder, a mounting for the movable member having a slidable connection therewith, and means for moving the mounting toward and from the stationary member.

2. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a movable member having a substantially flat face to engage the opposite side of the binder, a mounting for moving the movable member toward and from the stationary member perpendicular thereto, and an operative connection between the movable member and its mounting whereby movement of the binder causes the movable member to approach the stationary member.

3. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a mounting block mounted on the frame to move toward and from the stationary member perpendicular thereto, the mounting block having a guide disposed at an incline to the stationary member, and a gripper block carried by the mounting block and having a gripping face parallel to the stationary member, said gripper block having a portion inclined and engageable by the guide of the mounting block so that movement of the gripper block relative to the mounting block and parallel to the stationary member results in varying the separation between the gripper block and the stationary member.

4. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a mounting block mounted on the frame to move toward and from the stationary member perpendicular thereto, said mounting block having a recess therein, a gripper block located in the recess of the mounting block and having a face to engage the other side of the binder, and a key and keyway connection between the mounting block and gripper block, said keyway being inclined relative to the stationary member so that movement of the gripper block parallel to the stationary member varies the separation therebetween.

5. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a mounting block mounting on the frame to move toward and from the stationary member perpendicular thereto, said mounting block having a recess therein, a gripper block located in the recess of the mounting block and having a face to engage the other side of the binder, a key and keyway connection between the mounting block and gripper block, said keyway being inclined relative to the stationary member so that movement of the gripper block parallel to the stationary member varies the separa-

tion therebetween, and a spring biasing the gripper block in a direction to separate it from the stationary member.

6. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a gripper block to engage the opposite side of the binder, said gripper block having a bore extending therein, a mounting block carried by the frame and movable toward and from the stationary member perpendicular thereto, said mounting block having a socket therein in alignment with the bore of the gripper block, a key and keyway connection between the gripper block and mounting block, the same being inclined relative to the face of the stationary member whereby movement of the gripper block relative to the mounting block varies the separation between the gripper block and the stationary member, a spring located in the aligned bore of the gripper block and socket of the mounting block to bias the gripper block to move away from the stationary member, and means for moving the mounting block toward and from the stationary member.

7. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a gripper block having a substantially flat face to engage the opposite side of the binder, a mounting block carried by the frame to move toward and from the stationary member, guide means for insuring that the movements of the mounting block are perpendicular to the stationary member, a key and keyway connection between the mounting block and gripper block to permit relative movement therebetween, said connection being inclined to the plane of the stationary member so that movement of the gripper block parallel to the stationary member varies the separation therebetween, and means for moving the mounting block.

8. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a gripper block having a substantially flat face to engage the opposite side of the binder, a mounting block movable toward and from the stationary member perpendicularly thereto, a key and keyway connection between the gripper and mounting blocks inclined toward the stationary member in the direction of the binder tension, a spring for retaining the gripper and mounting blocks together and biasing the gripper block away from the stationary member, and means for moving the mounting block toward and from the stationary member.

9. A binder gripper comprising a frame having a stationary member to engage one side of a binder, a gripper block to engage the opposite side of the binder, a mounting block movable toward and from the stationary member perpendicular thereto, the mounting and gripper blocks having cooperative connections permitting the latter to move parallel to and toward and from the stationary member independently of the mounting block, and means for moving the mounting block.

In witness whereof, I hereunto subscribe my name this 8th day of July, 1932.

HOWARD C. PORTER.