Oct. 1, 1946. W. L. KEEHN 2,408,560

PLATE CLAMP

Filed Jan. 7, 1944 2 Sheets-Sheet 1

Fig. 1

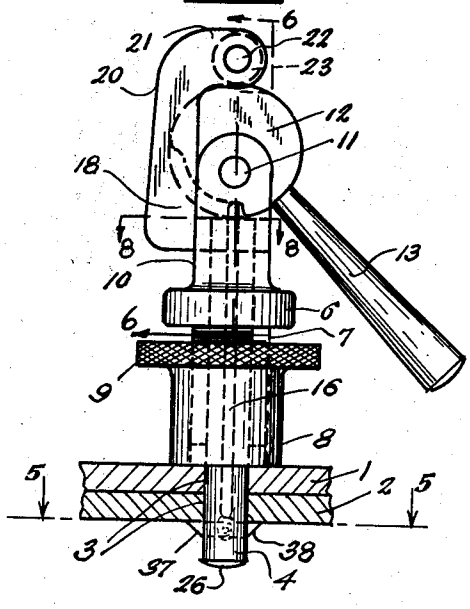


Fig. 2

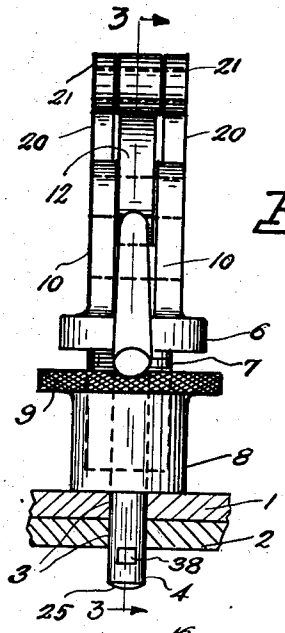


Fig. 3

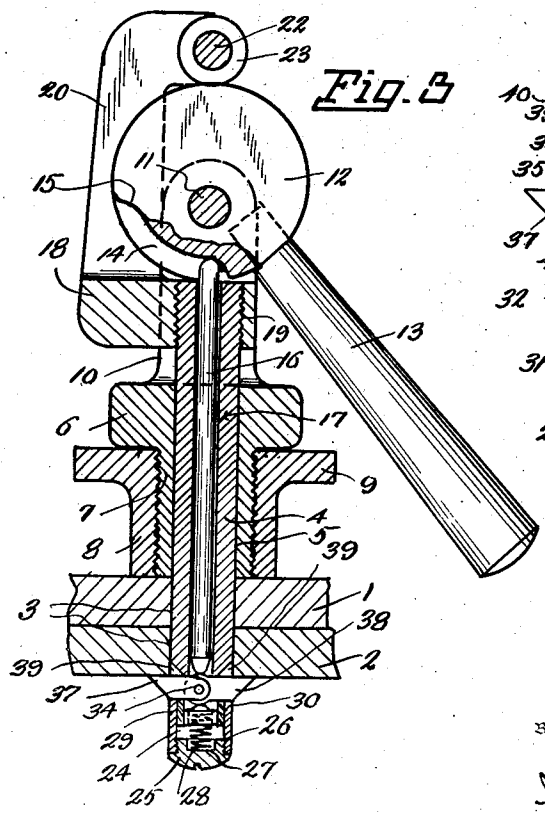
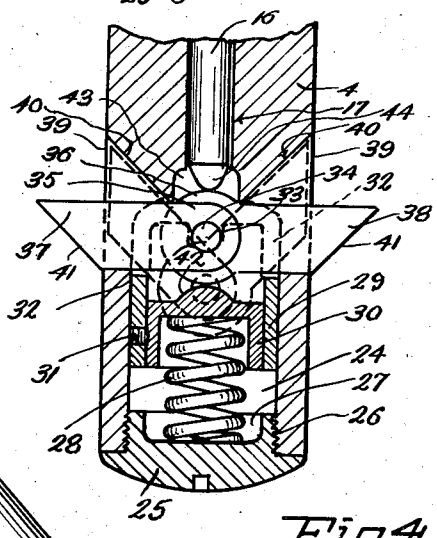


Fig. 4



Inventor

Warner L. Keehn

By

Glenn L. Fish

Attorney

Oct. 1, 1946. W. L. KEEHN 2,408,560

PLATE CLAMP

Filed Jan. 7, 1944 2 Sheets-Sheet 2

Fig. 5

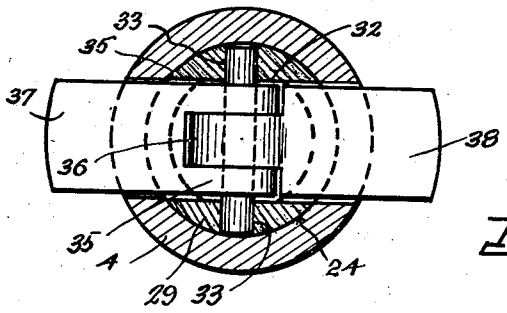
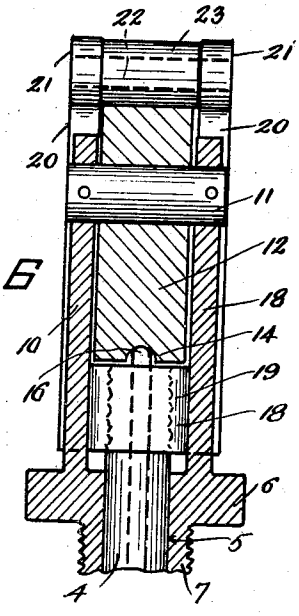


Fig. 6



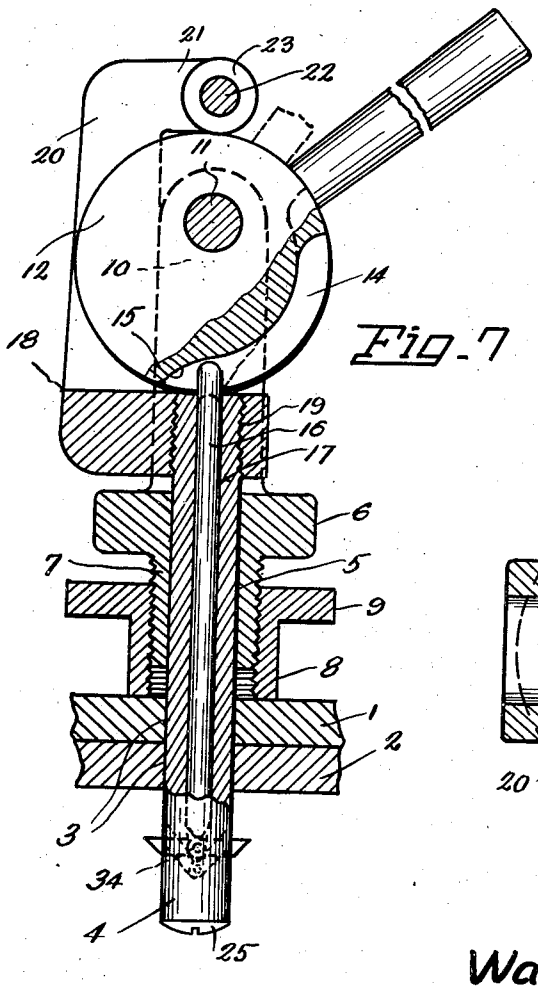


Fig. 7

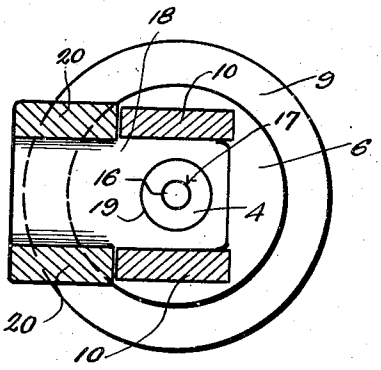


Fig. 8

Inventor

Warner L. Keehn

By

Glenn L. Fisk.

Attorney

Patented Oct. 1, 1946

2,408,560

UNITED STATES PATENT OFFICE

2,408,560

PLATE CLAMP

Warner L. Keehn, Spokane, Wash.

Application January 7, 1944, Serial No. 517,424

9 Claims. (Cl. 85—5)

1

This invention relates to a clamp and more particularly to a clamp by means of which plates disposed one upon another may be firmly held in close face to face engagement with each other while rivets are applied as permanent fasteners for the plates.

One object of the invention is to provide a clamp which is cam-actuated and by means of which plates may be very tightly pressed against each other during application of rivets.

Another object of the invention is to provide a clamp including a shaft adapted to be passed through registering openings in the plates and carrying dogs for engaging the under face of one plate when the shaft is shifted upwardly by a pressure applying cam.

Another object of the invention is to so mount the dogs that they may be tilted to a retracted position while the shaft is being passed downwardly through the registering openings of the plates, the dogs being moved to retracted position by a rod passing longitudinally through the shaft and actuated by a cam which also shifts the shaft upwardly to a clamping position.

Another object of the invention is to so mount the dogs that when the rod is relieved of pressure by the cam, a spring may move the dogs to extended position for engaging the under face of the lower or inner plate.

Another object of the invention is to provide the clamp with a base or support adapted to be adjusted to accommodate the clamp to the thickness of the plates and also permitting a preliminary clamping action to be applied to the plates and the cam then actuated for final clamping of the plates close against each other.

Another object of the invention is to provide a clamp of this character which is simple in construction and very easy to apply and operate.

In the accompanying drawings:

Fig. 1 is a side elevation of the improved clamp showing the same in clamping engagement with plates.

Fig. 2 is a front view of the clamp.

Fig. 3 is a sectional view taken vertically through the clamp along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view on an enlarged scale of the lower portion of the clamp.

Fig. 5 is a sectional view taken transversely through the lower portion of the clamp on the line 5—5 of Fig. 1.

Fig. 6 is a fragmentary sectional view taken through the upper portion of the clamp, on the line 6—6 of Fig. 1.

2

Fig. 7 is a view similar to Fig. 3, with the clamp in releasing position.

Fig. 8 is a sectional view on the line 8—8 of Fig. 1.

This improved clamp is used to hold plates 1 and 2 in close contacting face to face engagement with each other while rivets are applied to secure the plates together. The plates are formed with registering openings 3 to receive a shaft 4 which constitutes an element of the clamp and is slidable longitudinally through the bore 5 of a support 6. This support has a threaded shank 7 carrying a nut or internally threaded sleeve 8 formed about its upper end with an outstanding flange 9 having its edge face knurled so that it may be gripped and the sleeve turned and effect adjustment of the sleeve and the support longitudinally of each other, as shown in Figs. 3 and 7. Bearing arms or posts 10 extend upwardly from the support 6 and between their upper ends extends a shaft 11 serving as a mounting for a cam disc 12. The cam has a handle 13 by which it is turned and its peripheral edge face is formed with a groove 14 constituting an auxiliary cam surface which extends partially about the circumference of the disc and at one end is formed with a sloping shoulder 15. This groove 14 is provided to receive the upper end of a plunger rod 16 which is slidable longitudinally through the bore 17 of the shaft 4. A bracket 18 has a base formed with a threaded opening 19 to receive the threaded upper end of shaft 4. The arms 20 of the bracket extend upwardly from its base at opposite sides thereof and upper ends of the arms 20 are provided with forwardly extending bearings 21 carrying a shaft 22 upon which a roller 23 is rotatably mounted. This roller is engaged by the upper portion of the peripheral edge of the cam disc and, by reference to Figs. 3 and 7, it will be seen that when the cam is in the position of Fig. 3, the shaft 4 will be drawn upwardly to clamping position whereas, when the cam is turned to the position of Fig. 7, the shaft will be shifted downwardly to releasing position. When upward movement of the handle is continued, to the position indicated by dotted lines in Fig. 7, the shoulder 15 will act upon the upper end of the rod 16 and depress the rod for a purpose to be set forth hereinafter.

The lower end portion of the shaft 4 is hollowed to form a pocket 24 having its lower end normally closed by a cap 25 formed with a threaded shank 26 which is screwed into the lower end of the pocket and, by referring to Figs. 3 and 4,

it will be seen that the shank is formed with a recess 27 constituting a seat for a helical spring 28. A sleeve or carrier 29 is slidably mounted within the pocket 24 and within the lower portion of the sleeve 29 is an inner sleeve 30 held in place by a set screw 31. The upper end of the spring 28 is received in the cup-shaped inner sleeve or filler 30 and urges the sleeve 29 upwardly. The sleeve 29 is also cup-shaped and formed across its upper portion with a diametrically extending slot 32 at opposite sides of which the sleeve is formed with bearings 33 to receive a pin or shaft 34. The shaft 34 passes through the ears 35 and 36 of dogs 37 and 38 to pivotally mount the dogs. These dogs project outwardly through openings 39 at opposite sides of the pocket and upon reference to Fig. 4, it will be seen that the upper ends or edges 40 of the openings are disposed diagonally at an upward incline toward their outer ends and lower ends of the openings extend at right angles to walls of the pocket. By this arrangement, the dogs may be tilted upwardly to retracted position and, since outer end edges 41 of the dogs are cut diagonally, the dogs will be disposed entirely within the shaft and the shaft may be thrust downwardly through registering openings in the plates, or withdrawn therefrom. The ear 36 of dog 38 is substantially circular and has its lower portion resting upon a hemispherical boss at the center of the inner sleeve 30, as shown in Fig. 4, and its upper portion projecting into the enlarged lower end portion or throat 43 of the bore 17 and engaged by the tapered lower end 44 of the rod 16.

When this clamp is in use, the cam is turned to the position indicated by dotted lines in Figure 7, to move the shoulder 15 into engagement with the upper end of the rod 16 and force the rod downwardly to press against the ear 36 and effect retraction of the dogs by contact with lower ends of the slots 39 as the sleeve 29 is depressed and the spring 28 compressed. During turning of the cam, the shaft 4 is shifted downwardly through the bore 5 of the support 6 and the shaft is passed downwardly through registering openings in the plates. The cam disk is then turned in an opposite direction toward the position of Fig. 3 by swinging the handle 14 downwardly and, during this movement, the cam moves out of compressing engagement with the upper end of the rod and allows the dogs to be projected outwardly to the extended position by expansion of the spring 28, the cam then acting upon the roller 23 to shift the shaft 4 upwardly and move the dogs into abutting engagement with the under face of the plate 2. Continued turning of the cam causes the plates to be tightly clamped against each other between the dogs and the lower end of the shank 7 of the support and its sleeve 8 and a rivet may then be passed through the plates and headed. If it is found that with the sleeve in the position of Fig. 3, sufficient pressure is not applied to the plates, the sleeve may be turned downwardly toward the position of Fig. 7 so that it projects downwardly from the lower end of the support and the cam then turned to shift the shaft 4 upwardly and the support downwardly and strong clamping pressure will be applied to the plates. It will thus be seen that the clamp may accommodate itself to the thickness of the plates to be riveted together, and plates of various thicknesses clamped tightly against each other, while rivets are applied. After the rivets are applied, the handle is swung upwardly to turn the cam disc and shift the shaft downwardly and depress the rod to retract the dogs, the shaft being then drawn upwardly out of the registering openings of the plates. The clamp may then be transferred to another set of registering openings and pressure applied to clamp the plates against each other while other rivets are passed through the plates and headed.

Having thus described the invention, what is claimed is:

1. A plate clamp comprising a support, a sleeve threaded upon said support for resting upon plates to be riveted together about registering openings therein and shifting the support vertically to adjusted positions, bearing arms extending upwardly from said support, a shaft slidable longitudinally through said support between said arms with its lower portion protruding downwardly from the support for passing through the openings in the plates, said shaft being formed with a longitudinal bore and a pocket at the lower end of the bore, a removable cap for the lower end of said pocket, there being side openings leading from the upper end of the pocket at an upward incline and formed with straight cut lower ends, a sleeve slidable vertically in said pocket and having its upper portion formed with a diametrically extending slot, dogs in said slot projecting outwardly through the side openings and having overlapping ears at their inner ends, a pin carried by said sleeve and passing through said ears to pivotally mount the dogs for tilting movement from extended position to an upwardly inclined retracted position, a bracket carried by the upper end of said shaft and extending upwardly therefrom, a roller carried by the upper end of said bracket and disposed over the shaft, a rod slidable longitudinally through the bore of said shaft with its lower end resting upon the ear of one dog and its upper portion protruding from the shaft, a circular disc eccentrically mounted between the bearing arms and constituting a cam having its upper portion engaging said roller and its lower portion engaging the upper end of the shaft and formed with a circumferentially extending groove receiving the upper end of said rod, and a handle for turning said cam disc to shift the rod longitudinally for extending and retracting the dogs and shifting the shaft longitudinally to move the dogs into and out of position for abutting engagement with the under face of the plates to clamp the plates together between the dogs and lower ends of the support and its sleeve.

2. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through said support for passing through the registering openings, the shaft being formed with a longitudinal bore and a pocket at the lower end of the bore, a carrier in said pocket yieldably held against downward movement therein, dogs pivoted to said carrier and projecting outwardly from the pocket through openings in sides of the shaft, a rod slidable longitudinally through said bore with its upper end protruding from the shaft, said rod when depressed shifting the carrier downwardly for tilting the dogs inwardly to retracted position by engagement of the dogs with lower ends of the openings, a cam pivotally carried by said support with its lower portion bearing against the upper end of the shaft and provided with a groove con-

stituting an auxiliary cam surface for engaging the upper end of the rod, a member carried by said shaft and engaging the upper portion of the cam, and means for turning the cam to shift the shaft longitudinally and move the auxiliary cam surface of the cam into and out of position to depress the rod and effect retraction of the dogs.

3. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through said support for passing through the registering openings, the shaft being formed with a longitudinal bore and a pocket at the lower end of the bore, a carrier in said pocket yieldably held against downward movement therein, dogs carried by the carrier and projecting outwardly from the shaft through side openings thereof when the carrier is in raised position, a cam pivotally carried by said support with a lower portion bearing against the upper end of said shaft, a member carried by said shaft and having a portion extending upwardly therefrom and engaging the upper portion of said cam, means for moving the cam to shift the shaft longitudinally through the support and the openings of the plates, and a rod for depressing the carrier slidable longitudinally through the bore of said shaft with its upper end protruding from the shaft, said cam being provided with an auxiliary cam surface for acting upon the upper end of said rod and depressing the rod to shift the carrier downwardly and effect inward movement of the dogs by engagement of the dogs with lower ends of the side openings of the shaft.

4. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through said support for passing through the registering openings, the shaft being formed with a longitudinal bore and a pocket at the lower end of the bore, a carrier in said pocket yieldably held against downward movement therein, dogs carried by the carrier and projecting outwardly from the shaft through side openings thereof when the carrier is in raised position, the dogs being shifted inwardly to retracted position by engagement with lower edges of the slots when the carrier is moved downwardly, a rod for depressing the carrier slidable longitudinally through the bore of the shaft, a cam rotatably mounted over said shaft and having surfaces for engaging upper ends of the shaft and the rod for shifting the same downwardly when the cam is turned in one direction, and a member carried by said shaft and engaged by the upper portion of the cam for shifting the shaft upwardly when the cam is turned in an opposite direction.

5. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through said support for passing through the registering openings, the shaft being formed with a longitudinal bore and a pocket at the lower end of the bore, a carrier in said pocket yieldably held against downward movement therein, dogs carried by the carrier and projecting outwardly from the shaft through side openings thereof when the carrier is in raised position, the dogs being shifted inwardly to retracted position by engagement with lower edges of the slots when the carrier is moved downwardly, a rod for depressing

the carrier slidable longitudinally through the bore of the shaft, and a cam carried by said support for shifting the shaft longitudinally to raised and lowered positions and acting upon the upper end of said rod to depress the rod and effect retraction of the dogs when the cam is moved in one direction.

6. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through the support for passing through said openings, the lower portion of the shaft being formed with a pocket having side openings, dogs pivotally mounted in said pocket and normally projecting outwardly through the side openings to extended position, the dogs when shifted downwardly being tilted inwardly to retracted position by contact with lower ends of the openings, a rod carried by said shaft and shiftable downwardly to depress and tilt the dogs to retracted position, and a cam rotatably carried by said support and cooperating with the shaft and the rod for shifting the shaft longitudinally to clamping and releasing positions and shifting the rod longitudinally to retract the dogs.

7. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through the support for passing through said openings, the lower portion of the shaft being formed with a pocket having side openings, dogs pivotally mounted in said pocket and normally projecting outwardly through the side openings to an extended position, a rod shiftable longitudinally of said shaft into and out of position for depressing the dogs and effecting retraction thereof, and common means for shifting the shaft longitudinally into and out of a clamping position and depressing the rod to effect retraction of the dogs.

8. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through the support for passing through said openings, the lower portion of the shaft being formed with a pocket having side openings, dogs pivotally mounted in said pocket and normally projecting outwardly through the side openings to extended position, a rod shiftable longitudinally of said shaft into and out of position for depressing the dogs and effecting retraction thereof, a member for shifting said shaft longitudinally into and out of clamping position, and said member being engageable with the rod for depressing the same and retracting the dogs when the shaft is shifted to releasing position.

9. A plate clamp comprising a support for resting against the upper face of plates to be secured together about registering openings formed through the plates, a shaft slidable longitudinally through the support for passing through said openings, the lower portion of the shaft being formed with a pocket having side openings, dogs adjacent the lower end of said shaft normally projecting laterally from the shaft and movable to retracted position, a cam for shifting the shaft longitudinally into and out of clamping position, and a member actuated by said cam for effecting retraction of the dogs when the shaft is in releasing position.

WARNER L. KEEHN.