Dec. 30, 1952 A. H. JOSEPH 2,623,560

POLYGONAL FRAMEWORK TYPE CLAMPING MACHINE

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Fig. 1.

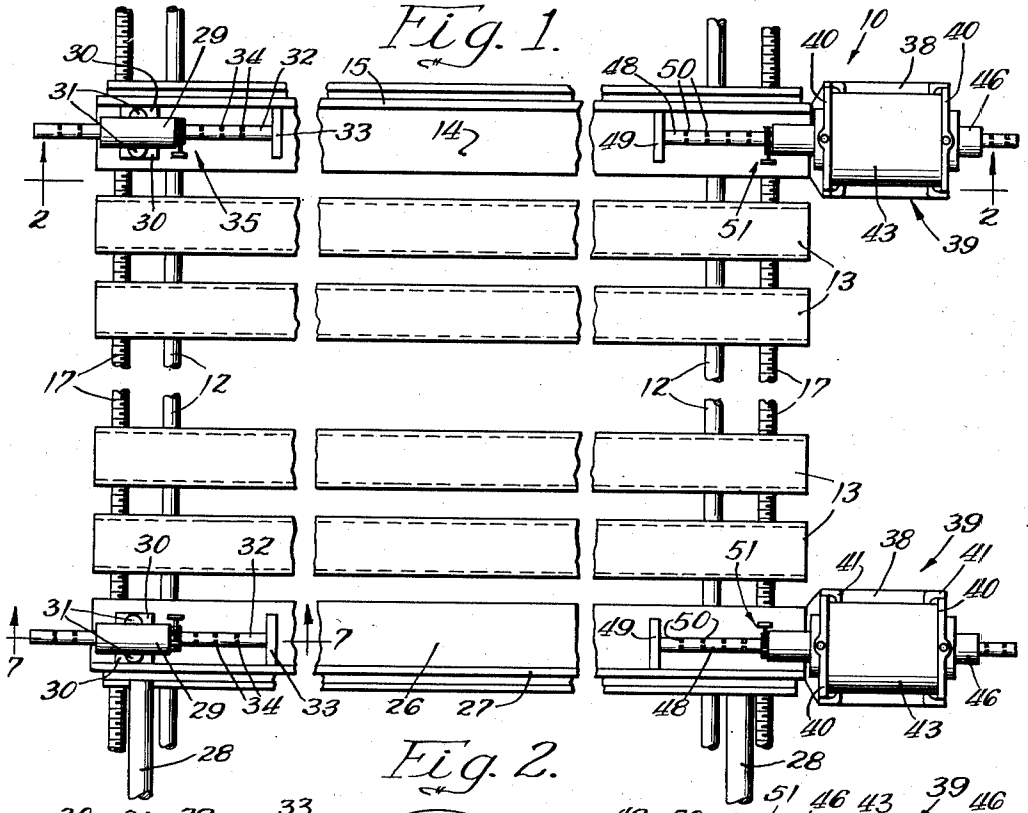
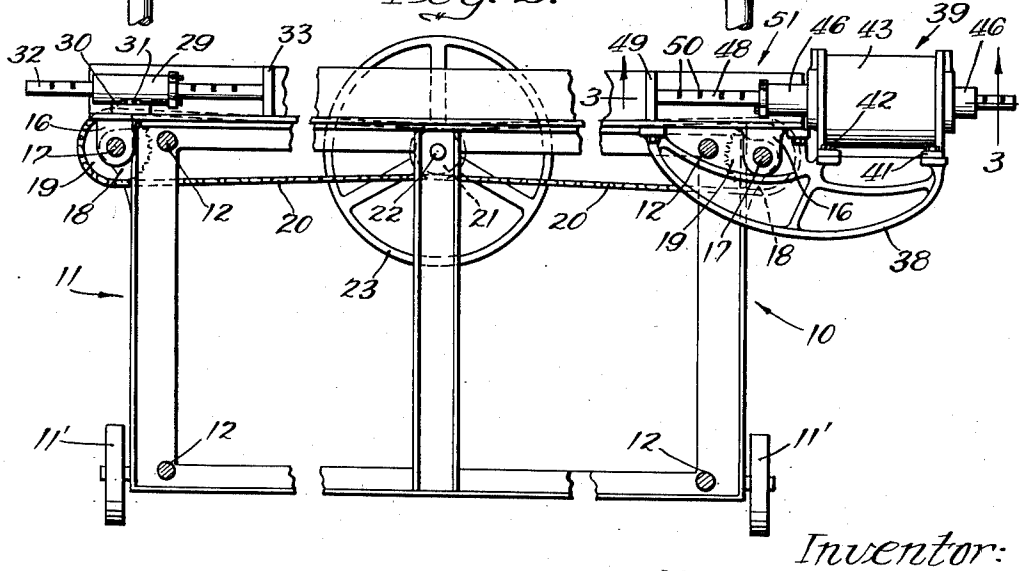


Fig. 2.



Inventor:
Alan H. Joseph,
By Armand A. Cyr
Atty.

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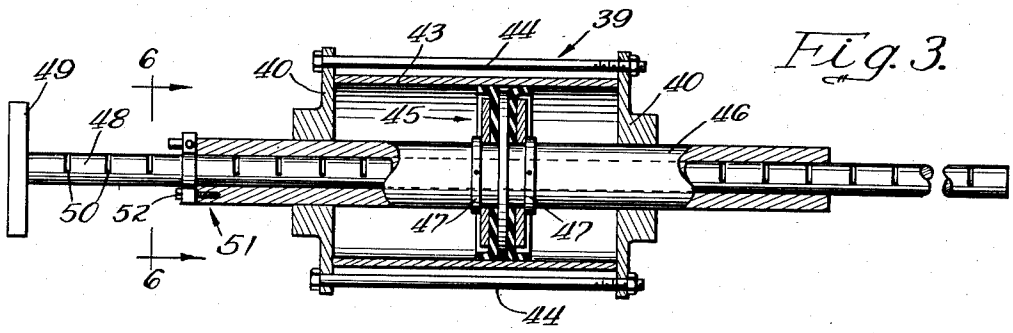


Fig. 3.

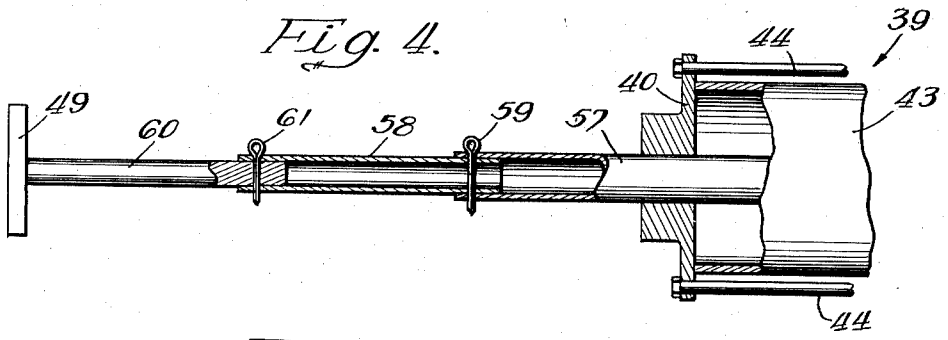


Fig. 4.

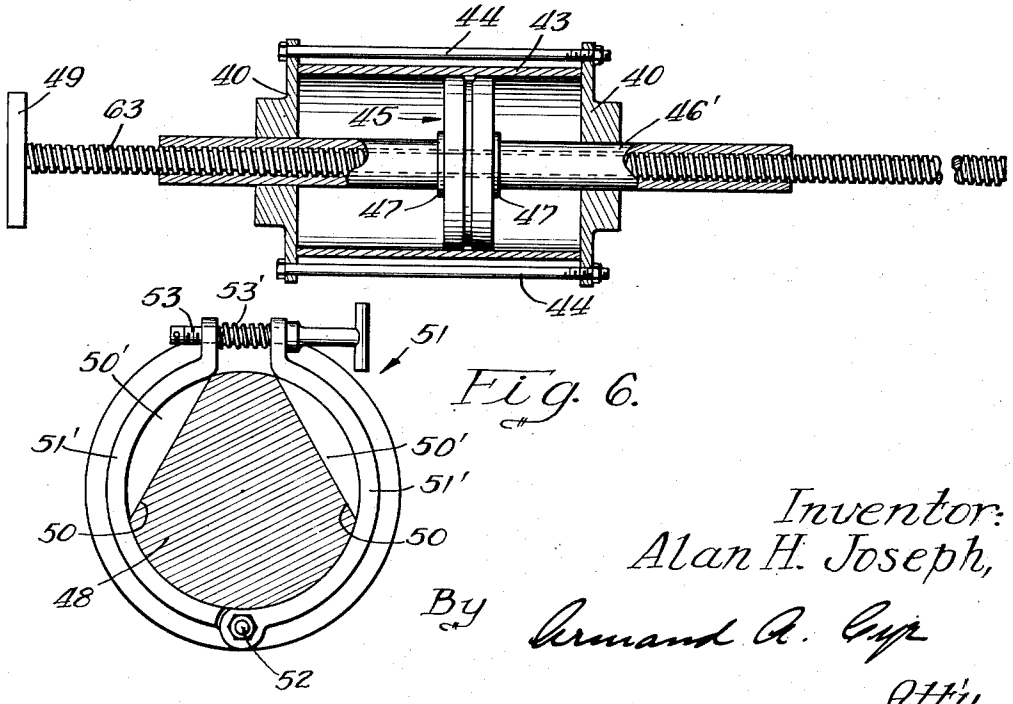


Fig. 5.

Fig. 6.

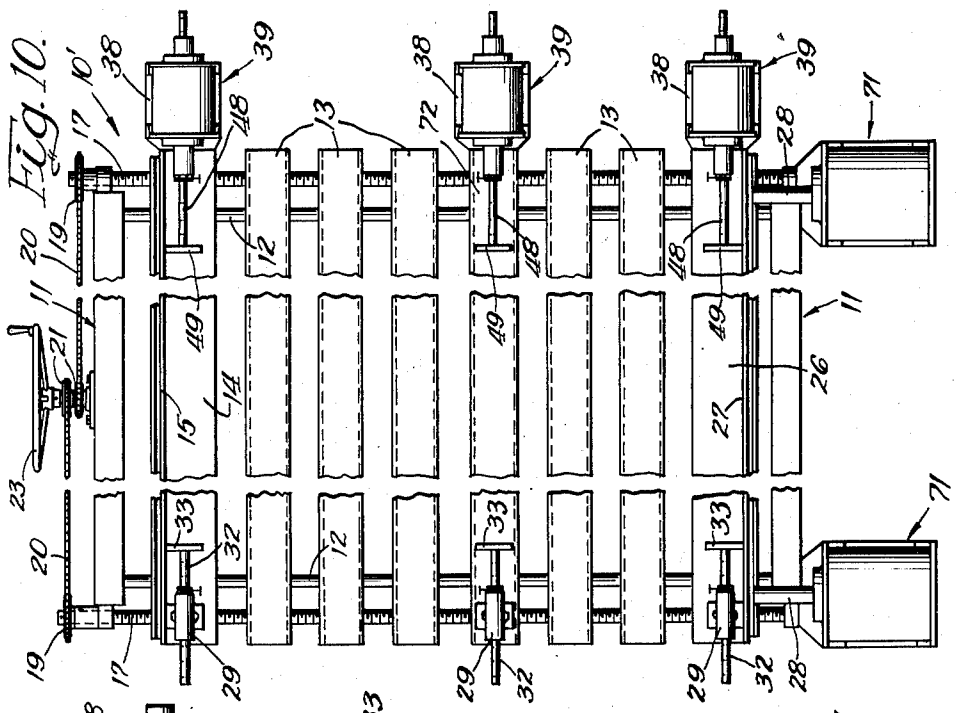
Inventor:
Alan H. Joseph,
By Armand A. Cyr
Atty.

Dec. 30, 1952 A. H. JOSEPH 2,623,560

POLYGONAL FRAMEWORK TYPE CLAMPING MACHINE

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Fig. 10.



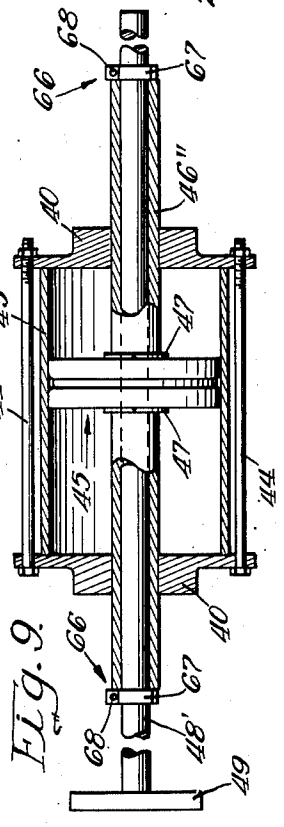


Fig. 9.

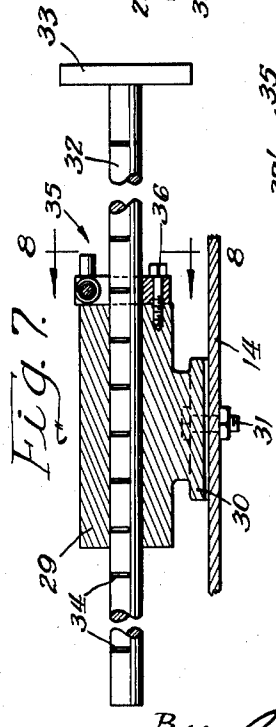


Fig. 7.

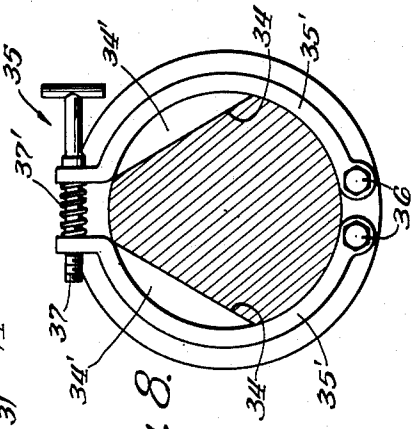


Fig. 8.

Inventor:
Alan H. Joseph,
By Armand A. Cyr
Atty's.

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POLYGONAL FRAMEWORK TYPE CLAMPING MACHINE

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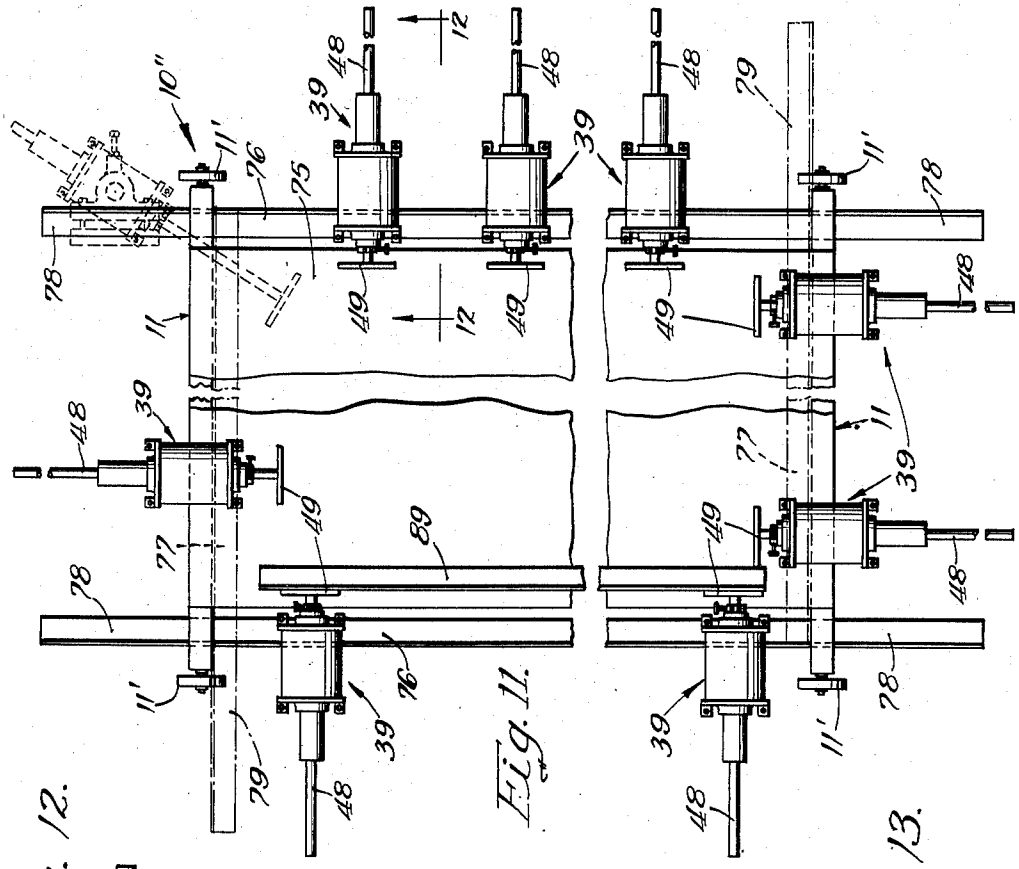


Fig. 11.

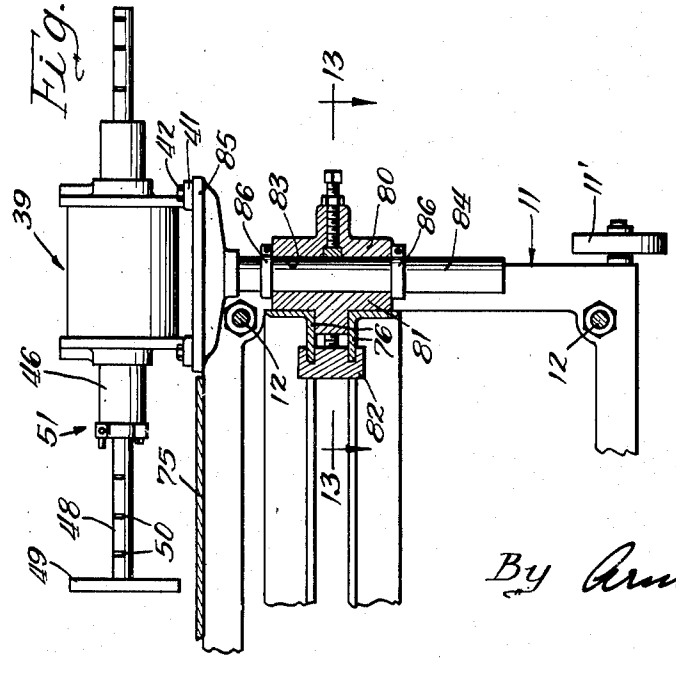


Fig. 12.

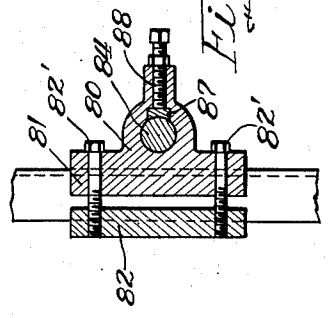


Fig. 13.

Inventor:
Alan H. Joseph,
By Armand A. Cyr
Atty.

Patented Dec. 30, 1952

2,623,560

UNITED STATES PATENT OFFICE

2,623,560

POLYGONAL FRAMEWORK TYPE CLAMPING MACHINE

Alan H. Joseph, Chicago, Ill., assignor to Handy Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application January 15, 1948, Serial No. 2,349

3 Claims. (Cl. 144—291)

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This invention relates generally to clamping devices for use in assembling window sash, doors, drawers, furniture frames, etc., and it has particular relation to power operated and/or power and hand operated clamping devices capable of adjustment for a wide range of applications and sizes of workpieces to be clamped.

Among the objects of this invention are: To provide a power clamping device that is adjustable for a wide range of workpieces; to provide various adjusting mechanism for the clamping device; to apply the clamping pressure to the workpiece along a line extending through the points of pressure application to opposite sides of the workpiece; and to provide for adjustably positioning a plurality of clamping devices along the rails forming a rectangular frame, for clamping a wide variety of shapes and sizes of workpieces.

With the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a top plan view of the central portion of a clamping machine constructed in accordance with this invention;

Fig. 2 is a detail sectional view taken along the line 2—2 of Fig. 1;

Fig. 3 is a longitudinal sectional view through a preferred form of power clamping device;

Figs. 4 and 5 are views similar to Fig. 3 and showing different embodiments of the power clamping device;

Fig. 6 is a detail sectional view at an enlarged scale, taken on the line 6—6 of Fig. 3;

Fig. 7 is a longitudinal sectional view through an adjustable mounting for a back stop used in the clamping machine;

Fig. 8 is a detail sectional view at an enlarged scale, taken on the line 8—8 of Fig. 7;

Fig. 9 is a view similar to Fig. 3 and showing still another construction for the power clamping device;

Fig. 10 is a top plan view of a clamping machine in accordance with this invention, having means intermediate its ends and along the sides for clamping the intermediate portion of a workpiece as well as the ends thereof;

Fig. 11 is a top plan view of another embodiment of the clamping machine, in which the clamping devices are mounted individually and

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adjustably along rails forming a part of the framework of the machine;

Fig. 12 is a detail sectional view at an enlarged scale, taken along the line 12—12 of Fig. 11; and

Fig. 13 is a detail sectional view taken on the line 13—13 of Fig. 12.

Referring now particularly to Figs. 1 and 2 of the drawings, it will be noted that the reference character 10 designates generally a clamping machine which includes rectangular end frames, shown generally at 11, that may be formed of angles welded together. Rollers 11' may be provided near the lower ends of each of the end frames 11 to make the clamping machine 10 portable. Tension rods 12 extend between the end frames 11 and cooperate therewith to provide a rigid construction. As shown in Fig. 1, transverse members 13 in the form of channels or the like are spaced apart to provide the bed of the machine 10 for receiving and supporting a workpiece to be clamped.

At one end of the machine 10 there is provided a back plate 14 which has an upstanding flange 15 that is arranged to engage one end of the workpiece. Underneath the back plate 14 there are downwardly extending arms 16 which cooperate with threaded rods 17 that are journaled in bearings 18. Sprockets 19 are fast on the threaded rod 17, and chains 20 are trained thereover, and over sprockets 21 which are carried by a shaft 22 that has a hand wheel 23 fastened thereto. It will be understood that the position of the back plate 14 can be adjusted by turning the hand wheel 23 to accommodate different lengths of workpieces.

At the other end of the machine 10, there is provided a clamp plate 26 which is slidable on the tension rods 12. It has an upstanding flange 27 for engaging the adjacent end of the workpiece, and rods 28 are attached thereto which, as will appear hereinafter, can be operated by power cylinders for moving the clamp plate 26 toward the back plate 14 to clamp the workpiece therebetween.

With a view to clamping the sides of the workpiece and to using the same mechanism for clamping various widths of workpieces, the mechanism now to be described may be employed. It will be noted that the back plate 14 and the clamp plate 26 each carry at one end a tubular member 29 which has integrally formed foot portions 30 that may be secured, as by bolts 31, to the plates 14 or 26. This construction is shown in more detail in Fig. 7, where it will be observed that a rod 32 is slidably

mounted in the tubular member 29, and carries a back stop 33 at its forward end. The rod 32 is adjustable in the tubular member 29 in order to permit clamping of various widths of workpieces. As shown, it has slots 34 at spaced intervals with which a clamp mechanism shown generally at 35 cooperates. The clamp mechanism 35 is shown in more detail in Fig. 8, where it will be noted that it includes a pair of C-shaped clamp members 35' that have detents 34' formed integrally therewith for interfitting with the slots 34. The clamp members 35' are pivoted at separate pivots, as indicated at 36, although as will appear hereinafter, a single pivot can be used to accomplish the desired result. A clamp screw 37 is arranged to move the clamp members 35' toward each other and into clamping engagement with the rod 32. The clamp members are biased apart by a coil compression spring 37'.

Cooperating with the back stop 33 and the mechanism associated therewith on each of the plates 14 and 26, is a power operated mechanism which will now be described. As shown in Figs. 1 and 2, each of the plates 14 and 26 has a supporting frame 38 at the right hand end which is arranged to carry an air cylinder that is shown generally at 39. In Fig. 3, the details of construction of the air cylinder are shown more clearly. It will be noted that it includes end plates 40 which have integrally formed foot portions 41, Fig. 2, that may be secured by bolts 42 to the support frame 38. A cylindrical member 43 extends between the end plates 40 and is held in fluid-tight relation therewith by suitable means such as tension bolts 44. Within the cylindrical member 43, a piston 45 is slidably mounted. The cylindrical member 43 is arranged to have air under pressure to be applied to either end for operating the piston 45 in opposite directions. Since any suitable arrangement of air supply can be used, the same is not shown. It will be understood that various hydraulic fluids, such as oil and the like, can be used instead of air if desired.

A sleeve 46 is slidably mounted in the end plates 40 and it extends through the piston 45. Collars 47 are secured to the sleeve 46 on opposite sides of the piston 45 so as to cause conjoint movement of the piston 45 and sleeve 46. Slidably mounted within the sleeve 46 is a rod 48 which carries at its forward end a pressure plate 49. It will be noted that the pressure plate 49 is opposite the back stop 33, and it will be understood that the sides of the workpiece may be clamped therebetween on application of suitable pressure to the piston 45. The construction is such that the pressure of the piston 45 is applied directly to the workpiece and axially of the rod 48, so that the pressure is applied along a line extending through the points of pressure application to the workpiece.

It is desirable that the rod 48 be adjustable with respect to the sleeve 46 in order to accommodate various widths of workpieces. Accordingly, the rod 48 may be slotted as indicated at 50, and a clamp mechanism, shown generally at 51, carried by the forward end of the sleeve 46 may be used for operatively interconnecting the sleeve 46 and rod 48.

In Fig. 6, the clamp mechanism 51 is shown in more detail. It will be noted that it includes a pair of C-shaped clamp members 51' which have integrally formed detents 50' that are arranged to interfit with the slots 50. The clamp members 51' are pivoted at 52, which, in this case, constitutes a single or common pivot for both of the clamp members 51'. A clamp screw 53 may be employed for moving the clamp members 51' into engagement with the rod 48. A coil compression spring 53' serves to bias the clamp members 51' apart. Other mechanisms for adjusting the position of the pressure plate 49 with respect to the piston 45 may be employed. Certain of these will now be described.

As shown in Fig. 4, a tubular member 57 may be slidably mounted in the end plates 40 of the air cylinder 39. Another tube 58 may be telescoped in the tube 57 and held against relative longitudinal movement by a pin 59. At its other end, a rod 60 is telescoped within the tube 58 and held in position by a pin 61. At its forward end, the rod 60 carries the pressure plate 49. Several apertures may be provided in the tubes 57 and 58, and in the rod 60 for receiving the pins 59 and 61 at various locations to provide the desired degree of adjustability.

In Fig. 5 there is shown another manner in which the pressure plate 49 can be adjustably positioned with respect to the piston 45. It will be noted that a sleeve 46', similar to the sleeve 46, is slidably mounted in the end plates 40, and that it is internally threaded for receiving a threaded rod 63 which carries at its forward end the pressure plate 49. By screwing the rod 63 in or out of the sleeve 46', the position of the pressure plate 49 can be adjusted.

In Fig. 9 there is shown still another means for adjustably interconnecting the pressure plate 49 and the piston 45. A sleeve 46'' extends through the end plates 40 and through the piston 45. A smooth rod 48' is slidably mounted in the sleeve 46''. At the ends of the sleeve 46'' are friction clamps which are indicated generally at 66. Each clamp 66 includes a band clamp 67 and a cooperating clamp screw 68. By tightening the screw 68, the rod 48' is frictionally gripped and held to the sleeve 46''.

In Fig. 10 there is illustrated generally at 10' a clamping machine which is generally the same as that shown in Figs. 1 and 2, and described hereinbefore. The plates 14 and 26 carry back stops 33 and pressure plates 49 that may be adjusted and operated in the manner described above. Power cylinders 71 to which the rods 28 are attached, may be employed for moving the clamp plate 26 toward the back plate 14. In addition, an intermediate transverse member 72 carries a back stop 33 and a pressure plate 49, and the associated apparatus for adjusting and operating the same. This permits the clamping of the workpiece on opposite sides and intermediate its ends, as well as on the sides at the ends.

In Fig. 11 there is shown generally at 10'' a clamping machine which is generally similar to that shown in Figs. 1 and 2. It includes end frames 11 which have rollers 11' for making the machine portable. A bed plate 75 extends between the end frames 11 for receiving the workpieces. Extending between the end frames 11 are side rails 76, while cross rails 77 extend at right angles thereto, adjacent the end frames 11. The side rails 76 may have extensions 78, and the cross rails 77 may have extensions 79 for a purpose which will be apparent presently. Preferably, the rails 76 and 77, as shown in Figs. 12 and 13, are in the form of rolled angle sections, although it will be understood that other shapes may be used.

A bearing block 80 is slidably mounted be-

tween adjacent side rails 76, as shown in Fig. 12, and it has a key portion 81 which extends therebetween. A clamp block 82 cooperates with the rail 76 on the side opposite the bearing block 80, and may be clamped thereto by bolts 82' which extend through the bearing block 80 and are threaded into the clamp block 82. This permits positioning of the bearing block 80 and apparatus carried thereby at any desired position along the side rails 76, and also clamping of the same thereto. A similar construction is employed along the cross rails 77.

The bearing block 80 has a vertical opening 83 therein, in which a vertical shaft 84 is rotatably mounted. At its upper end, the shaft 84 carries a plate 85 for receiving the foot portions 41 of the air cylinder 39 which may be secured thereto by the bolts 42. Clamp collars 86 are frictionally secured to the shaft 84 above and below the bearing block 80 for positioning the plate 85 at the desired level.

In order to clamp the shaft 84 against turning, a clamp block or shoe 87 bears against the same with force exerted by a set screw 88.

It will be understood that any of the clamping devices shown in Figs. 3, 4, 5 and 9 may be employed in the clamping machine 10'' shown in Fig. 11. By providing the extensions 78 and 79 on the side rails 76 and cross rails 77 respectively, it is possible to position the clamping devices along these extensions as may be desired for clamping irregularly shaped workpieces. An example of this is illustrated in the upper right hand corner of Fig. 11.

The cross rails 77 and their extensions 79 are shown by broken lines, since their use in the clamping machine 10'' is optional.

A clamp plate 89 may be carried by the pressure plates 49 of the clamping devices located along the left hand side rail 76, as shown in Fig. 11. This clamp plate 89 may cooperate with three or more clamping devices which are located along the right hand side rail 76, as shown. The clamping devices on the end frames 11 serve to apply pressure to the ends of the workpiece. It will be understood that their number can be varied as desired.

It will be understood that the term "power cylinder," as used in the following claims, is not to be construed as a limitation, but rather as an example of one means for operating the pressure plate. It is obvious that motor driven means, or even manually operated means may be employed for moving the pressure plate toward or away from the workpiece.

While I have shown and described what I consider to be preferred embodiments of my invention in such detail that the same may be readily understood by those skilled in the art, I am aware that other embodiments, and changes in those herein described, may be made without departing from the spirit of the invention as expressed in the following claims.

What I claim and desire to secure by Letters Patent is:

1. In a clamping machine of the character described, a stop member for engaging one side of a workpiece, a power cylinder, a piston operable therein, a sleeve having a length greater than the length of said cylinder extending through said cylinder and the piston therein, said sleeve being secured to said piston and slidable in the opposite ends of said cylinder, a rod movable longitudinally in said sleeve for transmitting pressure from said piston to a workpiece abutting said stop member, and means fixed with respect to said sleeve for cooperating with said rod to adjustably fix said rod in a plurality of positions longitudinally of said sleeve.

2. In a clamping machine of the character described, a stop member for engaging one side of a workpiece, a power cylinder, a piston operable therein, a sleeve having a length greater than the length of said cylinder extending through said cylinder and the piston therein, said sleeve being secured to said piston and slidable in the opposite ends of said cylinder, an externally threaded rod movable longitudinally in said sleeve for transmitting pressure from said piston to a workpiece abutting said stop member, and means integral with said sleeve for cooperating with said rod to adjustably fix said rod in a plurality of positions longitudinally of said sleeve, said means comprising internally threaded portions on said sleeve for cooperating with said externally threaded portions on said rod.

3. In a clamping machine of the character described, a stop member for engaging one side of a workpiece, a power cylinder, a piston operable therein, a sleeve having a length greater than the length of said cylinder extending through said cylinder and the piston therein, said sleeve being secured to said piston and slidable in the opposite ends of said cylinder, a rod movable longitudinally in said sleeve for transmitting pressure from said piston to a workpiece abutting said stop member, and means fixed with respect to said sleeve for cooperating with said rod to adjustably fix said rod in a plurality of positions longitudinally of said sleeve, said means comprising a pair of clamp members carried by said sleeve, said clamp members having detents and said rod having slots in place thereof for releasably receiving said detents therein.

ALAN H. JOSEPH.

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