July 30, 1940. M. A. BELL 2,209,379

CLAMPING DEVICE

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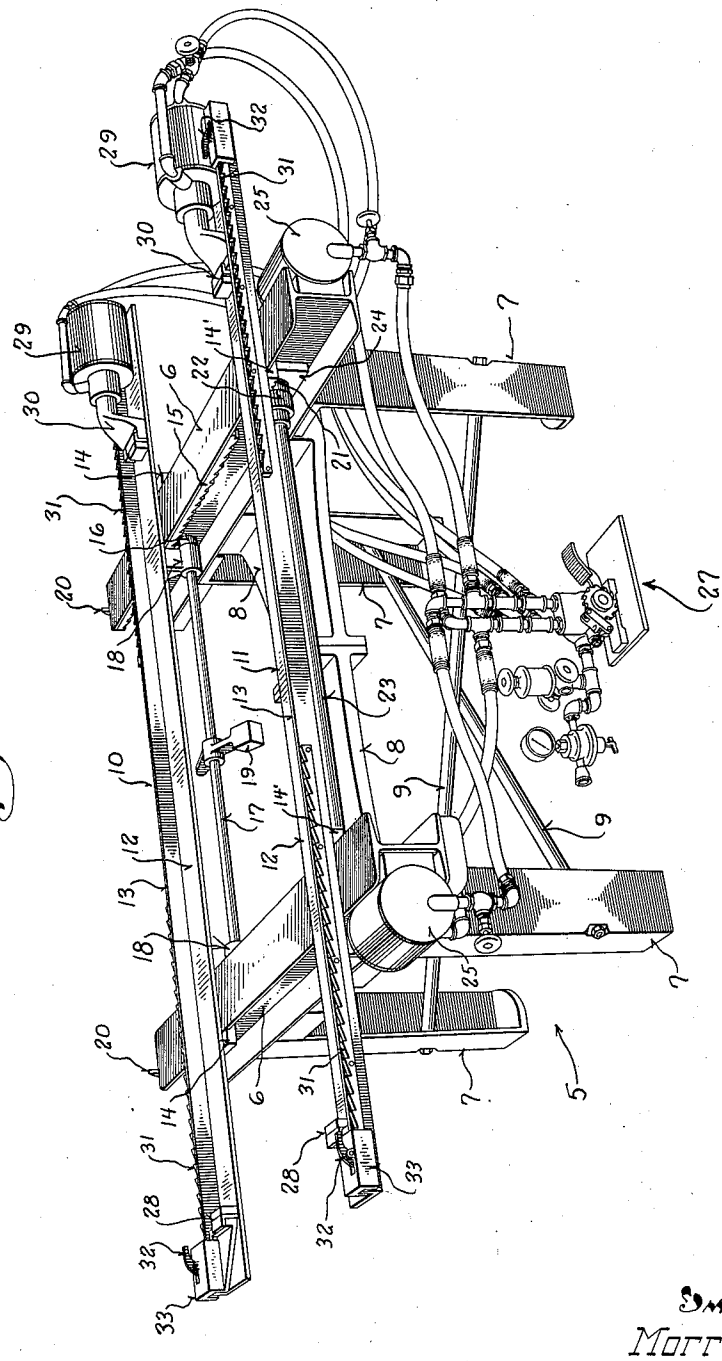


Fig. 1.

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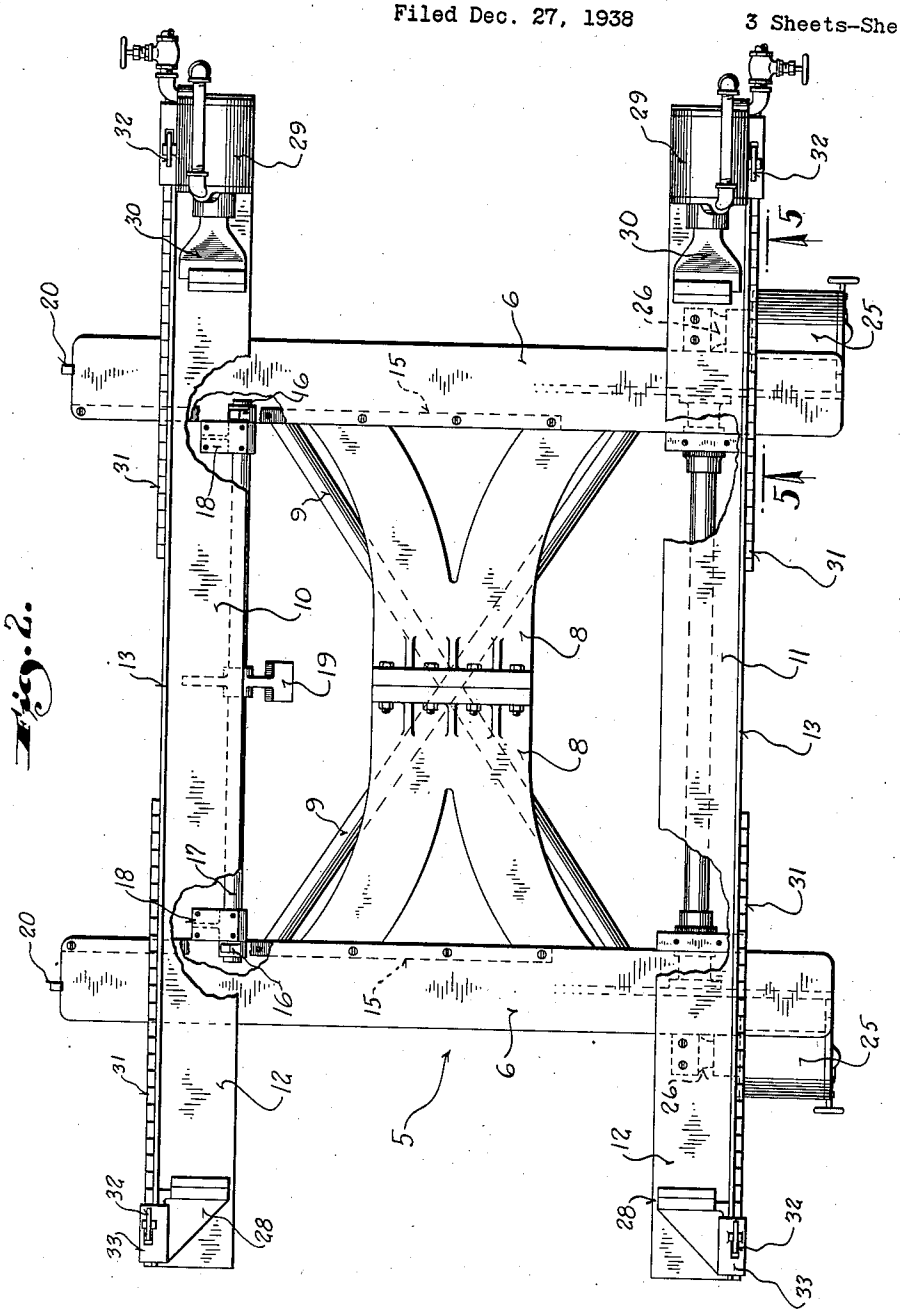


Fig. 2.

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Fig. 3.

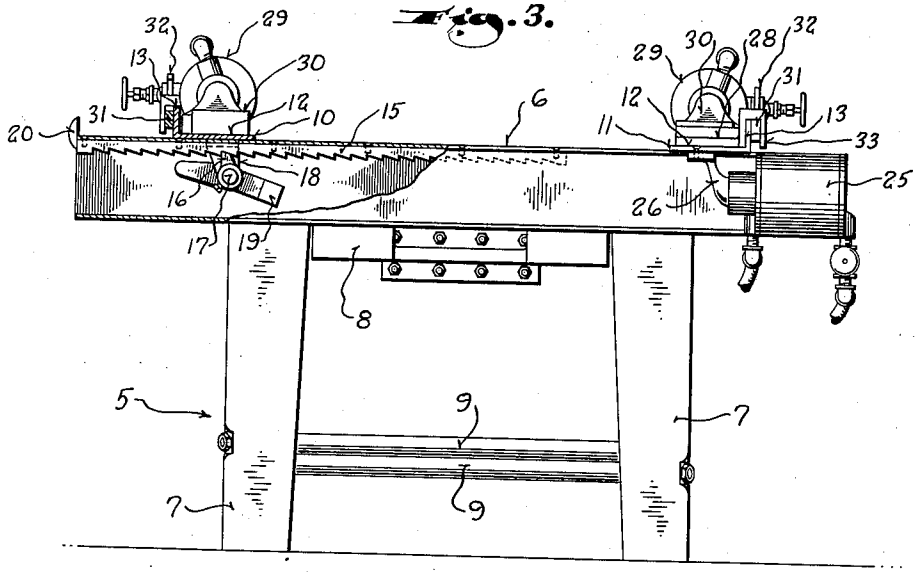



Fig. 4.

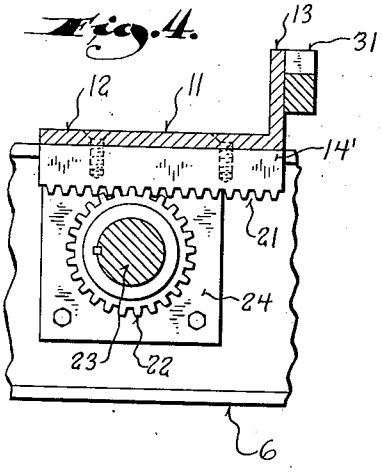



Fig. 5.

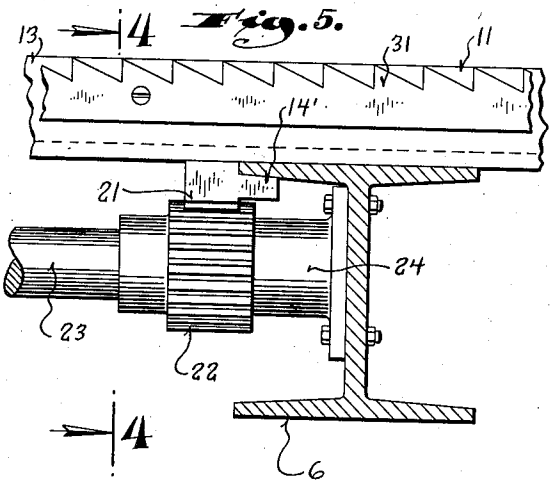
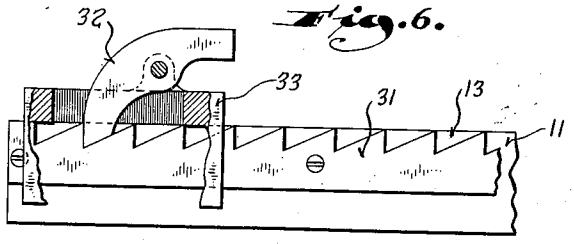



Fig. 6.




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Patented July 30, 1940

2,209,379

# UNITED STATES PATENT OFFICE

2,209,379

## CLAMPING DEVICE

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Application December 27, 1938, Serial No. 247,846

9 Claims. (Cl. 144—291)

This invention relates to improvements in clamping devices, and refers particularly to so-called clamping tables used in the woodworking art for gluing up large articles such as doors and window frames.

It is an object of this invention to provide a clamping device of this general character which is simple in design and construction, and which is readily adaptable to a wide variety of applications.

Another object of this invention is to provide a clamping device of the character described which is so designed and constructed as to at all times assure an absolutely square clamping action.

In this connection, it is an object of this invention to provide a clamping device having two cooperating longitudinal rails movable toward each other in a clamping action in such a manner that absolute parallelism is at all times maintained therebetween.

Another object of this invention is to provide a simple manner of quickly and accurately adjusting the stationary stops with which the power actuated pressure applying members cooperate in the clamping action.

A further object of this invention is to provide a clamping device of the character described which is simple and rugged in construction and well suited for the use for which it is intended.

With the above and other objects in view which will appear as the description proceeds, this invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described, and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawings illustrate one complete example of the physical embodiment of the invention constructed in accordance with the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a perspective view of a clamping device embodying this invention;

Figure 2 is a top view thereof;

Figure 3 is an end view of the clamping device looking toward the adjustable stationary stops on the parallel clamping rails;

Figure 4 is a detail sectional view taken through Figure 5 on the plane of the line 4—4;

Figure 5 is a detail sectional view taken through Figure 2 on the plane of the line 5—5; and

Figure 6 is a detail view, partly in section and partly in elevation, to illustrate the manner in which the adjustable stationary stops are secured to the longitudinal rails.

Referring now particularly to the accompanying drawings in which like numerals indicate like parts, the numeral 5 designates the supporting structure of the clamping device. It comprises two end units, each consisting of a crossbeam 6, preferably having an H-shaped cross section, and two legs 7 rigidly secured to the underside of the crossbeam. These two end units are joined by two castings 8, each of which is fixed to the underside of one of the crossbeams, and which are bolted together to jointly form an X-shaped strut. To further reinforce the supporting structure, the lower ends of the legs are joined by diagonal tie rods 9.

Slidable laterally across the tops of the crossbeams 6 are two rails 10 and 11. The rail 10 may be referred to as the adjustable stationary rail, while the rail 11 comprises the pressure applying movable rail. These two rails cooperate to transversely clamp articles therebetween.

Both of the rails are formed of angle iron sections with a wide horizontal flange 12 and a narrow vertical flange 13. The flanges 12 rest directly on the upper surface of the crossbeams 6.

The rail 10 is held against endwise motion and against displacement from the crossbeams while permitting lateral motion thereof by jibs 14 secured to its undersurface and slidably engaging the lower face of the adjacent flange on the crossbeam.

The rail 11 is likewise held in place by jibs 14' secured to the rail and slidably engaging the said flange of the crossbeam.

The adjustable stationary rail 10 is secured in any desired adjusted position by means of ratchet toothed racks 15 fixed to the underside of the inner flanges of the crossbeams 6, and with which pawls 16 carried by the rail engage. The teeth of the racks 15 on the two crossbeams are directly opposite each other, and both of the pawls 16 are mounted on a common shaft 17 journalled in bearings 18 depending from the undersurface of the rail 10. Hence, through rotation of the shaft 17, it is possible to simultaneously engage and disengage both of the pawls from their respective racks.

The pawls are normally held in operative engagement with their racks by a weighted lever

19 fixed to the shaft which tends to turn the same in a direction raising the pawls to their operative positions. To adjust the position of the rail 10, it is thus merely necessary to lift the weighted lever 19 so as to disengage the pawls and then slide the rail to its desired position. The extent of this adjustment of the rail 10 is, of course, restricted to the length of the ratchets 15, and is limited in one direction by fixed stops 20 secured to the adjacent ends of the crossbeams.

The movable pressure applying rail 11 is constrained to a translating motion by racks 21 fixed to the underside of the rail and preferably part of the jibs 14'. Pinions 22 fixed to the opposite ends of a shaft 23 journalled in bearings 24 secured to the crossbeams, mesh with the racks 21, and inasmuch as the racks are directly opposite each other, it follows that any lateral motion of the rail 11 will be constrained to a translating motion, which is at all times parallel to the rail 10.

To move the rail 11 forwardly in a clamping action, an air cylinder 25 is mounted on the adjacent end of each crossbeam 6. The pistons of these air cylinders are connected through arms 26 with the rail 11 so that by simultaneously controlling the admission of air pressure to the cylinders, both are active on the rail 11 with substantially equal force.

The control of the application of air pressure to the cylinders 25 is by means of a foot actuated valve unit, indicated generally by the numeral 27. This unit, however, does not form a part of the present invention. It functions in the conventional manner, and its connection with the air cylinders 25 is deemed clear from the disclosure in Figure 1.

Each rail has an adjustable stationary stop 28 mounted thereon near one end, and an air cylinder 29 adjustably mounted near its opposite end. The pistons of the air cylinders 29 carry pusher members 30 which slide along the horizontal flanges 12 of the rails toward and from the stops 28 to longitudinally compress an article disposed between the rails.

The stops 28 are adjustably securable at different points along the length of the rails by ratchets 31 fixed to the vertical flanges 13 of the rails, and pawls 32 carried by the brackets 33 which mount the stops 28. The detail of this structure is clearly illustrated in Figure 6.

The two ratchets 31 are directly opposite each other so that by engaging the pawls of the stops 28 with the proper teeth, they will be directly opposite.

The air cylinders 29, as stated, are slidable along the length of the rails to increase the range of adjustment of the clamping device and are secured in adjusted positions in the same manner as the stops 28, that is, through the use of ratchets 31 carried by the rails and pawls 32 carried by the brackets which mount the air cylinders on the rails.

The air cylinders 29 like the cylinders 25 are supplied with air under pressure at the dictation of the control unit 27, but as the manner in which this is effected, forms no part of the present invention, a detailed description thereof is unnecessary.

From the foregoing description taken in connection with the accompanying drawings, it will be readily apparent that this invention provides a practical rugged clamping device suitable for use in the wood-working industry, which because of its novel design and construction is exceptionally flexible in its application, and easily and quickly adjusted to handle any one of a large number of different sized articles.

What I claim as my invention is:

1. A clamping device comprising: a rigid support; a pair of parallel horizontal rails mounted on said support to receive thereon an article to be clamped, one of said rails being laterally movable toward the other; hydraulic means for moving said rail toward the other in a clamping action; a connection between said movable rail and the rigid support to constrain the motion of said movable rail to a translating motion; a stationary stop carried by each of said rails; a cooperating movable stop carried by each of said rails, said stops being adapted to longitudinally clamp an article held between the rails; and pneumatic means for simultaneously forcing said movable stops toward the cooperating stationary stops.

2. A clamping device of the character described comprising: a supporting structure; a pair of parallel rails mounted on the supporting structure, one of said rails being movable toward the other in a clamping action; means for simultaneously applying clamping pressure at opposite end portions of said rails; a connection between said movable rail and the supporting structure constraining motion of the movable rail to a translating motion; a stationary stop adjustably mounted on each of said rails; a movable stop carried by each of said rails; and means for simultaneously forcing both of said movable stops toward their cooperating stationary stops.

3. A clamping device of the character described comprising: a rigid supporting structure having horizontal supporting surfaces; a rail mounted on the supporting structure and movable horizontally laterally over the supporting surfaces thereof; adjustable means for securing said rail in a fixed position on the supporting structure; another rail movable horizontally laterally over the supporting structure toward and from the first named rail; a connection between said movable rail and the supporting structure constraining motion thereof to a translating motion parallel with the first named rail; pneumatic means for forcing the movable rail toward the first named rail in a clamping action; a stationary stop carried by each of said rails; a movable stop carried by each of said rails; and pneumatic means for simultaneously forcing the movable stops toward the stationary stops in a clamping action.

4. In a clamping device of the character described: a rigid supporting structure having spaced horizontally disposed supporting surfaces; a rail movable horizontally laterally across the supporting surfaces of said supporting structure; adjustable means for securing said rail in a fixed position; another similar rail movable horizontally laterally across the supporting structure surfaces toward and from the first named rail; means for forcing said second named rail toward the first named rail in a clamping action; and means for constraining motion of the second named rail to a translating motion comprising, spaced racks carried by the movable second named rail, a pinion meshing with each of said racks, and a single shaft journalled in bearings carried by the supporting structure and to which each of said pinions is secured.

5. In a clamping device of the character described: a rigid supporting structure including spaced parallel horizontal crossbeams; a pair of parallel clamping rails, each horizontally laterally

movable over said crossbeams; a ratchet fixed to each of said crossbeams; a pawl engageable with each of said ratchets; common means mounting both of said pawls from one of the longitudinal rails, whereby said rail is readily secured in an adjusted stationary position; means for forcing the other rail toward the stationary rail in a clamping action; and means for constraining motion of said last named rail to a translating motion comprising, a rack carried by the rail at each end thereof, a pinion meshing with each of said racks, and a single shaft journalled in bearings carried by the crossbeams.

6. In a clamping device of the character described: a rigid supporting structure including, spaced parallel horizontal crossbeams; an adjustable stationary rail horizontally slidable laterally over said crossbeams; means for releasably securing said stationary rail to the crossbeams in any one of a number of different positions of adjustment; a movable rail horizontally slidable laterally over said crossbeams toward and from the adjustable stationary rail; a pneumatic pressure applying device mounted on each of said crossbeams and connected with said movable rail for forcing the movable rail toward the adjustable stationary rail in a clamping action; and means for constraining the movable rail to a translating motion comprising, a meshing rack and pinion connection between said movable rail and each of said crossbeams.

7. In a clamping device of the character described: a rigid supporting structure including, spaced parallel horizontal crossbeams; an adjustable stationary rail laterally horizontally slidable over said crossbeams; means for securing said adjustable stationary rail in a fixed position on the crossbeams comprising, a ratchet mounted on an undersurface of each of said crossbeams; a shaft extending longitudinally of said rail and journalled in bearings depending downwardly therefrom; a pawl mounted on each end of said shaft to engage the adjacent ratchet; gravity responsive means for normally holding said shaft and consequently the pawls attached thereto in an operative position; a movable rail horizontally slidable laterally over said crossbeams toward and from the adjustable stationary rail; means for forcing the movable rail toward the adjustable stationary rail in a clamping action; and means for constraining motion of the movable rail to a translating motion.

8. In a clamping device of the character described: a rigid supporting structure including, spaced parallel crossbeams; an adjustable stationary rail laterally slidable over said crossbeams; means for securing said adjustable stationary rail in a fixed position on the crossbeams comprising, a ratchet mounted on an undersurface of each of said crossbeams; a shaft extending longitudinally of said rail and journalled in bearings depending downwardly therefrom; a pawl mounted on each end of said shaft to engage the adjacent ratchet; gravity responsive means for normally holding said shaft and consequently the pawls attached thereto in an operative position; a movable rail slidable laterally over said crossbeams toward and from the adjustable stationary rail; means for forcing the movable rail toward the adjustable stationary rail in a clamping action; and means for constraining motion of the movable rail to a translating motion comprising, spaced racks carried by the movable rail, a pinion meshing with each rack, and a shaft journalled in bearings carried by the crossbeams and to which said pinions are secured.

9. In a clamping device of the character described: cooperating stationary and movable rails for supporting an article thereon and to transversely clamp the article therebetween; a stationary stop adjustably secured to each of said rails near one end thereof; a pneumatic pressure applying unit adjustably mounted on each rail near its opposite end; and movable stops actuated by said pressure applying units along said rails and toward the stationary stops to longitudinally clamp an article positioned between the rails.

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