Feb. 3. 1925.

1,525,122

G. E. ERICSSON

SHEET GLASS CLAMP

Filed June 5, 1924

2 Sheets-Sheet 1

FIG.1.

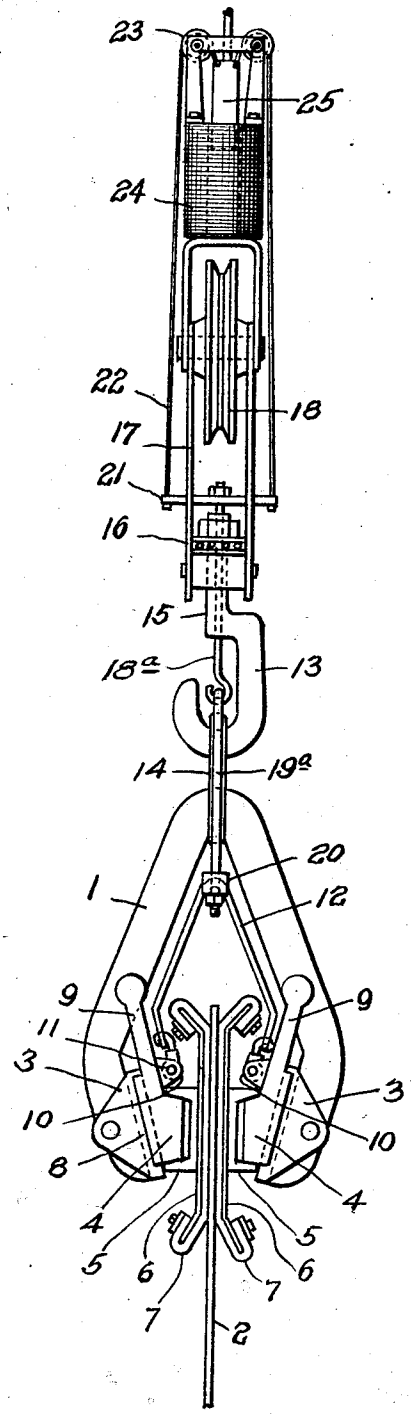
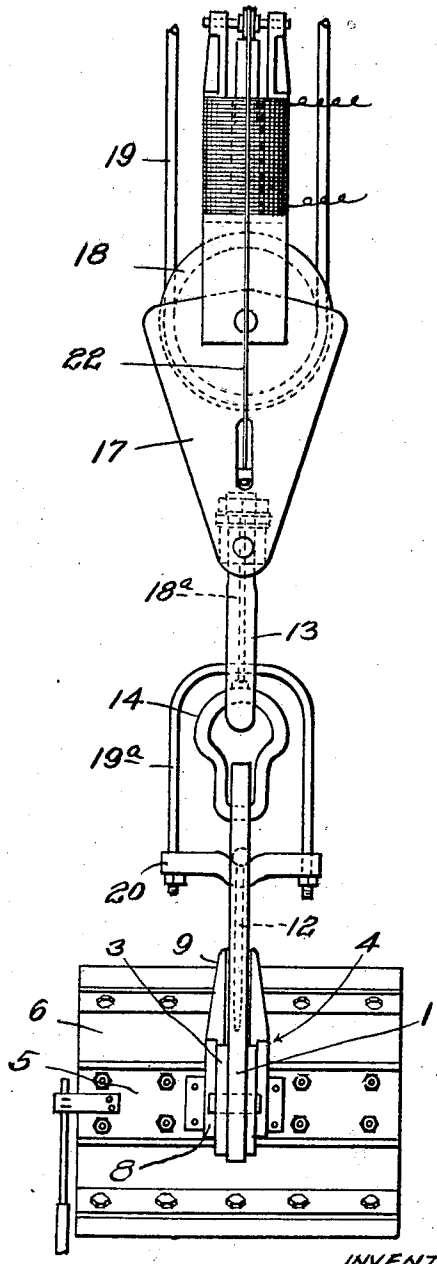


FIG.2.



INVENTOR

Gustav E. Ericsson

by James C. Bradley

atty

Feb. 3. 1925. 1,525,122

G. E. ERICSSON

SHEET GLASS CLAMP

Filed June 5, 1924 2 Sheets-Sheet 2

FIG. 3.

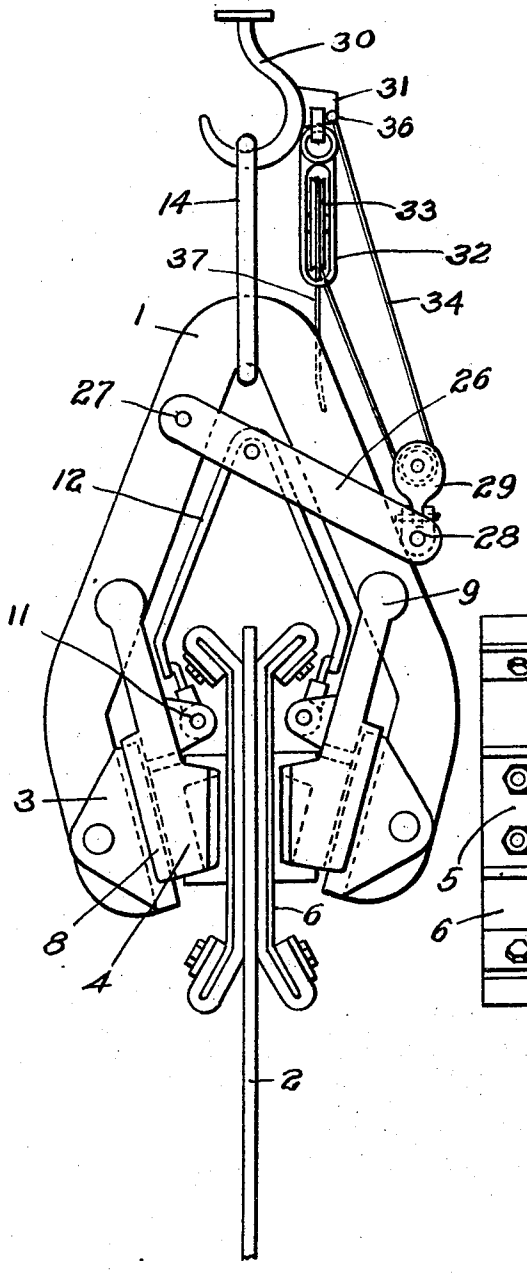
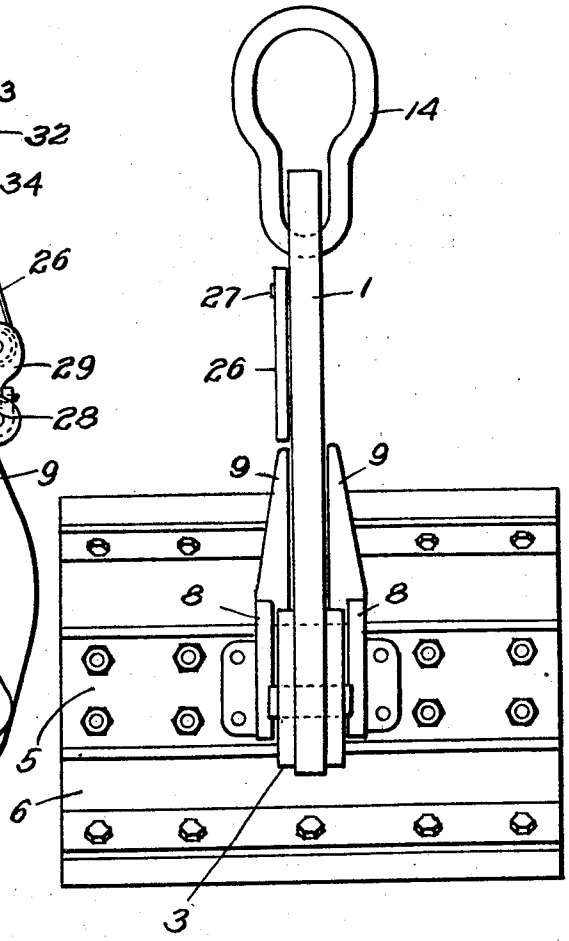


FIG. 4.



INVENTOR

Gustav E. Ericsson

by

James C. Bradley

Atty

Patented Feb. 3, 1925. 1,525,122

UNITED STATES PATENT OFFICE.

GUSTAV EDWARD ERICSSON, OF FORD CITY, PENNSYLVANIA, ASSIGNOR TO PITTSBURGH PLATE GLASS COMPANY, A CORPORATION OF PENNSYLVANIA.

SHEET-GLASS CLAMP.

Application filed June 5, 1924. Serial No. 718,020.

To all whom it may concern:

Be it known that I, GUSTAV EDWARD ERICSSON, a citizen of the United States, and a resident of Ford City. in the county of Armstrong and State of Pennsylvania, have made a new and useful invention in Improvements in a Sheet-Glass Clamp, of which the following is a specification.

The invention relates to clamps for gripping and transporting sheets of glass or other material in sheet form. It has for its principal objects, the provision of a compact clamp (1) which occupies a minimum amount of space laterally, so that it may be easily operated between racks which are close together, (2) which provides for clearance in the clamp above the glass, so that in lowering the clamp to gripping position, there is little danger of striking the edge of the glass and breaking it as the clamp is lowered preliminary to gripping the glass, and (3) which can be readily operated from below or by the operator above in the crane which carries the clamp. Two embodiments of the invention are illustrated in the accompanying drawings wherein:

Figures 1 and 2 are elevations at right angles to each other showing one form of device, and Figs. 3 and 4 are two other elevations at right angles to each other showing another form of the device.

The clamp is of the general type shown in the patent to Brown No. 1,431,928 employing a frame of inverted U shape with vertically movable jaws which approach as they move downward, but in the present construction, the arms of the U frame are fixed rigidly with respect to each other instead of being adjustable and positive means are provided for moving the jaws upward to secure their release after the lower edge of the glass has been placed upon a support. In its preferred form, the operating means for lifting the jaws comprises a solenoid whose operation may be controlled either by the workmen on the floor of the hall, or by the operator in the cage of the crane which carries the clamping apparatus, but other means aside from the solenoid may be employed for this purpose as indicated in Figs. 3 and 4, or such as an air cylinder. In either case, the release of the jaws from the glass may be controlled from either side of the glass sheet.

Referring first to the form of device employing the solenoid and illustrated in Figs. 1 and 2, 1 is an inverted U frame of very rigid construction which carries the jaws between which the upper edge of the glass sheet 2 is clamped. This frame has pivoted to the lower ends of its two arms the blocks 3, 3, which support the jaws and which adjust themselves to various angles depending upon conditions. The jaws comprise a pair of castings 4, 4, to which are riveted the channels 5, 5 and which in turn carry the metal plates 6, 6. The plates are covered with sheets of flexible material 7, 7, such as rubber which are extended around the diverging ends of the plates and held by means of bolts as illustrated. The castings 4, 4 fit loosely against the inclined faces of the blocks 3, 3, but are maintained in position by means of the flanges 8, 8 which overlap the sides of the blocks 3, 3 and by the arms 9, 9 which slidably overlap the sides of the arms constituting the U shaped frame 1. The arms 9, 9 carry on their inner sides the lugs 10, 10 to which are pivoted the brackets 11, 11, and to these brackets 11 is secured the bail 12 by means of which the jaws are released from the glass after the lower edge of the plate 2 is engaged with the rack upon which it is to be placed. The means for operating the bail 12 to raise and lower the jaws constitutes one of the features of the invention which will now be described.

The U frame 1 is supported from above by means of the hook 13 extending through the loop 14, and the stem 15 of the hook is swiveled, as indicated at 16, in the sheave frame 17. This sheave frame is provided with a pulley 18, around which passes the cable 19 for raising and lowering the device, such cable being connected to the operating drum on an overhead crane (not shown). The stem 15 of the hook is provided with a vertical perforation through which extends a rod 18^a with a hook at it lower end. This hook carries a bail 19^a connected at its lower end to the cross bar 20 extending through the bail 12. The rod 18^a extends at its upper end through a cross head 21, and this cross head is operated from above by means of the cables 22 passing over the pulleys 23. Mounted on the sheave frame 17 above the pulley 18 is a solenoid winding 24 having a core 25, to which the cables 22 are connected. Current may be sup-

plied to the solenoid winding by means of leads in a flexible cable, not shown, leading to the crane above, where it is coiled on a drum which is kept under a slight tension tending to wind up the drum constantly. If desired, the cable carrying the leads may also extend down to the floor of the hall where the application of current is controlled by the operator from a suitable switch.

In order to engage the upper edge of the sheet of glass which it is desired to move, current is applied to the solenoid, thus drawing the core down into the winding and lifting the jaws of the clamp through the connections above described, so that the jaws are separated to receive the sheet. The clamp is then lowered over the edge of the sheet, the diverging ends of the jaws assisting in guiding the sheet therebetween.

When the jaws are positioned over the edge of the sheet, the current to the solenoid winding is cut off and the jaws move down by gravity so that they grip the sheet of glass between them. The crane lifting device may now be operated to lift the clamp carrying the sheet of glass which is moved to its desired location and lowered so that its weight rests upon its lower edge, after which the solenoid is operated to release the jaws. The support afforded by the clamp is very secure as the weight of the jaws and the glass carried thereby causes the jaws by reason of their inclined relation with respect to the blocks 3, 3, to press in tightly against the sides of the sheet. By making the frame one of relatively stiff, heavy material, sufficient rigidity is afforded so that a large clearance may be provided in the clamp above the upper edge of the sheet of glass, so that there is practically no danger of the clamp engaging the upper edge of the sheet and breaking it due to the over travel of the crane operating mechanism, as the clamp is being lowered into position. The device is also of relatively narrow width laterally, so that it may be brought between racks which are closely adjacent, thus permitting the use of the device where clamps of other types could not be employed. The use of the clamp also reduces the amount of labor necessary in handling the glass. With the ordinary clamp, three men are ordinarily employed, one to attach and loosen the clamp and one on each end of the sheet to steady it. With the apparatus as above described, the man who would otherwise attach and loosen the clamp may be dispensed with since this part of the work can be taken care of by the crane operator or by one of the two operators who steady the glass.

Figs. 3 and 4 illustrate a modification in which the solenoid for operating the clamp jaws is dispensed with and cable and pulley devices substituted for accomplishing this function. While this form of apparatus is simpler, the labor involved in its use is greater and the operation necessarily slower and more difficult. In this construction, the clamp parts are the same as in the device of Figs. 1 and 2 and similar reference numerals are employed so that a detailed description is unnecessary. The bail 12 which lifts the jaws is connected to a lever 26 pivoted to the U frame 1 at 27. This lever has pivoted to its free end the block 28 to which is secured the sheave block 29. Integral with the hook 30 which supports the clamp is a lug 31 upon which is mounted a sheave frame 32 provided with the pulley 33. The cable 34 is secured to the lug 30 as indicated at 36 and passes around the pulley in the sheave block 29 and around the pulley 33, its free end 37 being extended downwardly so that it may be operated by the workmen on the floor of the hall. Various arrangements of tackle for swinging the lever may be substituted, and the operation throughout is similar to that heretofore set forth with respect to the apparatus of Figs. 1 and 4, the one difference being that the movement of the jaws is controlled by the pulley and cable device instead of by the solenoid.

What I claim is:

1. In combination in a clamp for moving sheet material, a rigid inverted U frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, positive operating means mounted above the jaws, and connections between said means and the jaws for moving the jaws upward relative to the frame.

2. In combination in a clamp for moving sheet material, a rigid inverted U frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, electromagnet operating means mounted above the jaws, and connections between said means and the jaws for moving the jaws upward relative to the frame when the electromagnetic operating means are operated.

3. In combination in apparatus for moving sheet material, a sheave frame provided with a pulley, a rigid inverted U frame suspended from the sheave frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically, and for a movement of approach when moved downwardly, a solenoid comprising a winding carried by the sheave frame, and a core movable in the winding, and connections between said core and said jaws for moving

the jaws upwardly when the core is drawn into the winding.

4. In combination in apparatus for moving sheet material, a sheave frame provided with a pulley, a rigid inverted U frame suspended from the sheave frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically, and for a movement of approach when moved downwardly, a solenoid comprising a winding carried by the sheave frame, above the pulley and a core movable in the winding, a second pulley mounted on the sheave frame above the core, and a flexible connection extending from the core over such second pulley and downward for moving the jaws upwardly when the core is drawn into the winding.

5. In combination in apparatus for moving sheet material, a sheave frame provided with a pulley, a supporting hook having a vertically perforated stem swivelled to the lower side of the sheave frame, a rigid inverted U frame, a loop connection between the upper end of the U frame and said hook, blocks pivoted to the ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, a vertical solenoid comprising a winding carried by the sheave frame above the pulley and a core mounted for movement through the upper end of the winding, a pair of pulleys carried by the sheave frame above the core, flexible members extending from the core over the pair of pulleys, and then downward, a cross head carried by said members below the first pulley, a connection extending from said cross head down through the perforation in the stem of said hook, a yoke carried by said connection extending around said hook and said loop and connections from the yoke to said jaws.

6. In combination in a clamp for moving sheet material, a rigid inverted U frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, positive operating means mounted above the jaws, and connections between said means and the jaws for moving the jaws upward relative to the frame, the said jaws being faced with yielding material and having their lower edges inclined away from each other to provide a tapering guideway for receiving the edge of the sheet of glass to be moved.

7. In combination in a clamp for moving sheet material, a rigid inverted U frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically and for a movement of approach when moved downwardly, a prime mover mounted above the jaws, and connections between said prime mover and the jaws for moving the jaws upward relative to the frame when said prime mover is operated.

8. In combination in apparatus for moving sheet material, a sheave frame provided with a pulley, a rigid inverted U frame suspended from the sheave frame, blocks pivoted to the lower ends of the arms of the U frame, opposing jaws mounted on the blocks for movement vertically, and for a movement of approach when moved downwardly, a prime mover carried by the sheave frame, and connections between said prime mover and the jaws for moving the jaws upward relative to the frame when said prime mover is operated.

In testimony whereof, I have hereunto subscribed my name this 5th day of May, 1924.

GUSTAV EDWARD ERICSSON.