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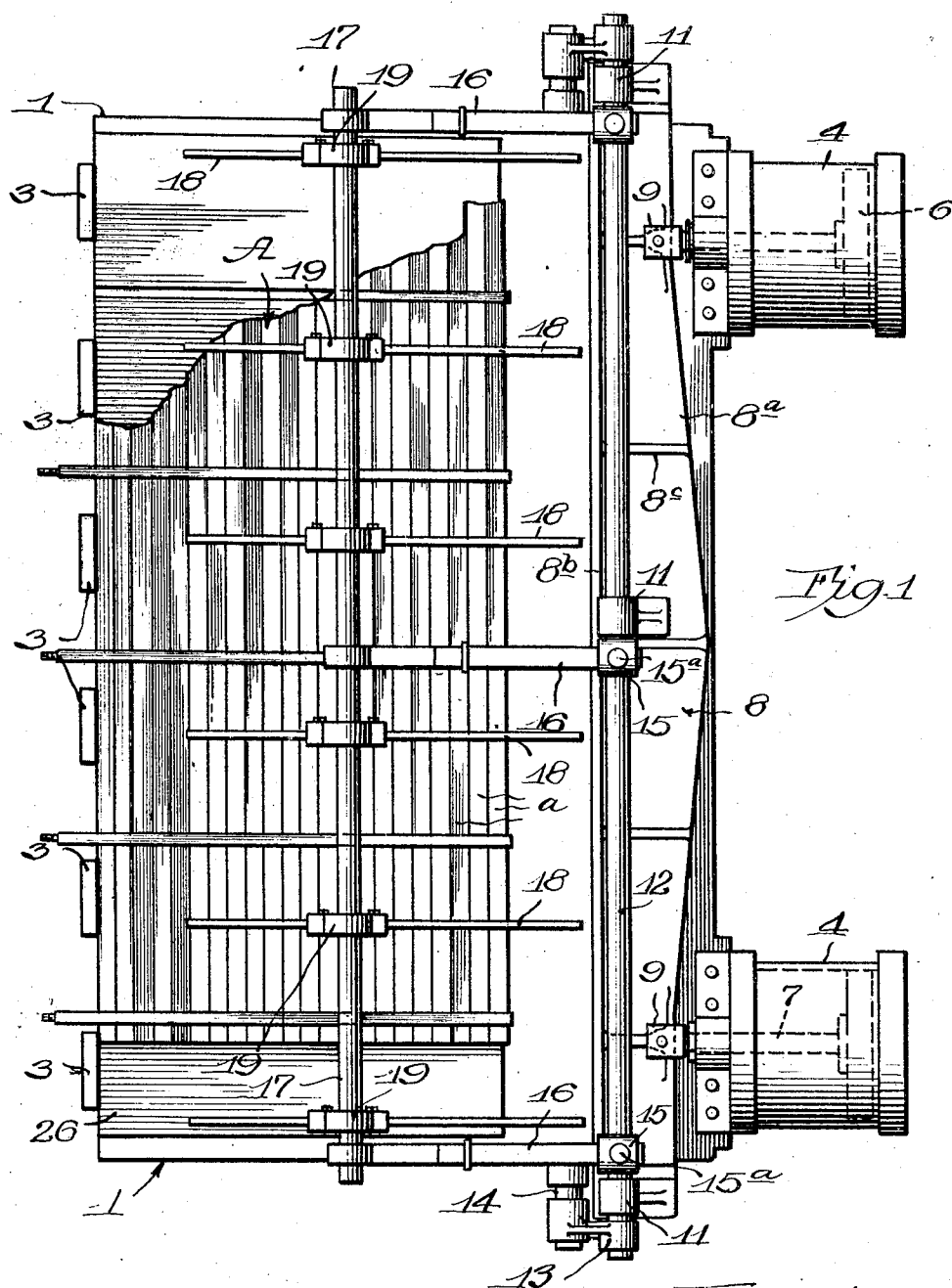
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E. C. LOETSCHER

POWER CLAMP

Filed May 6, 1927

3 Sheets-Sheet 1



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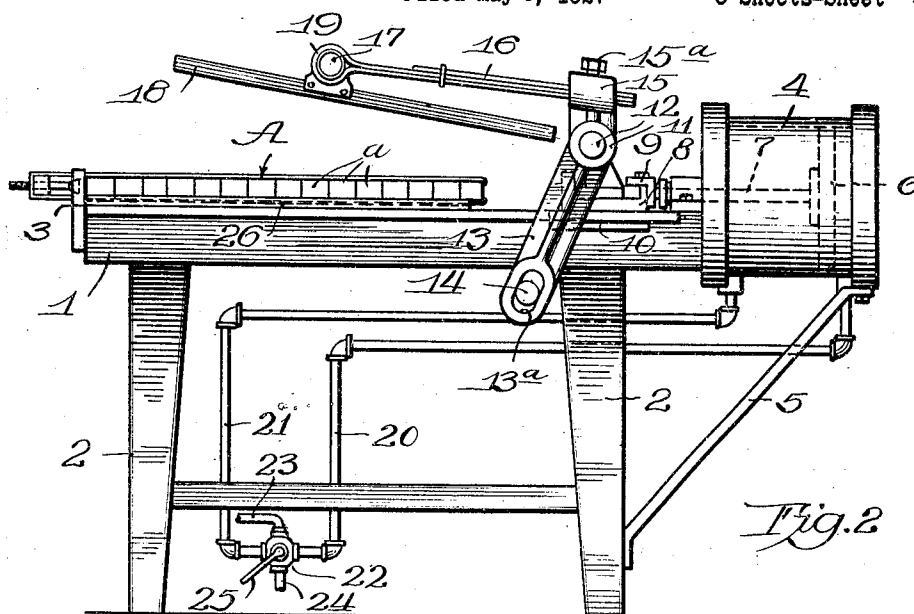
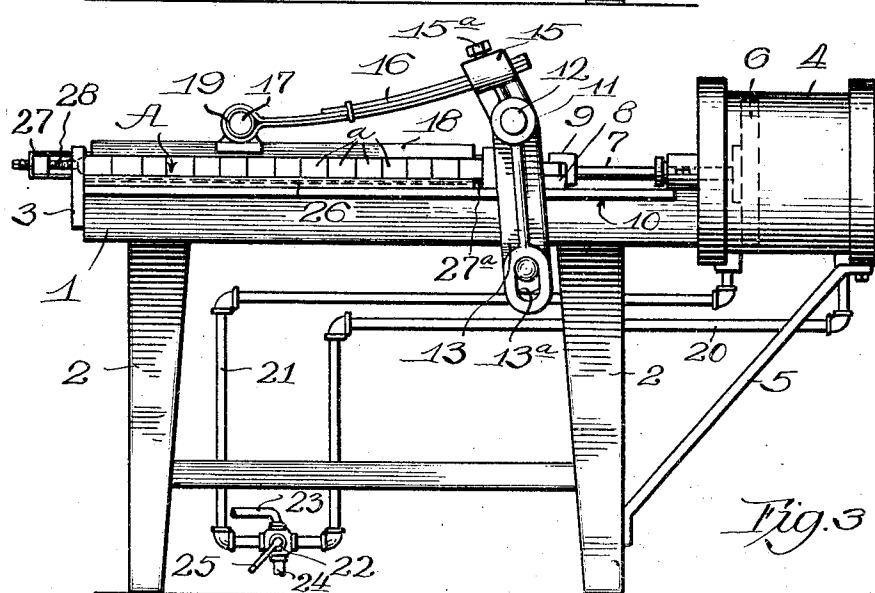
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3 Sheets-Sheet 2



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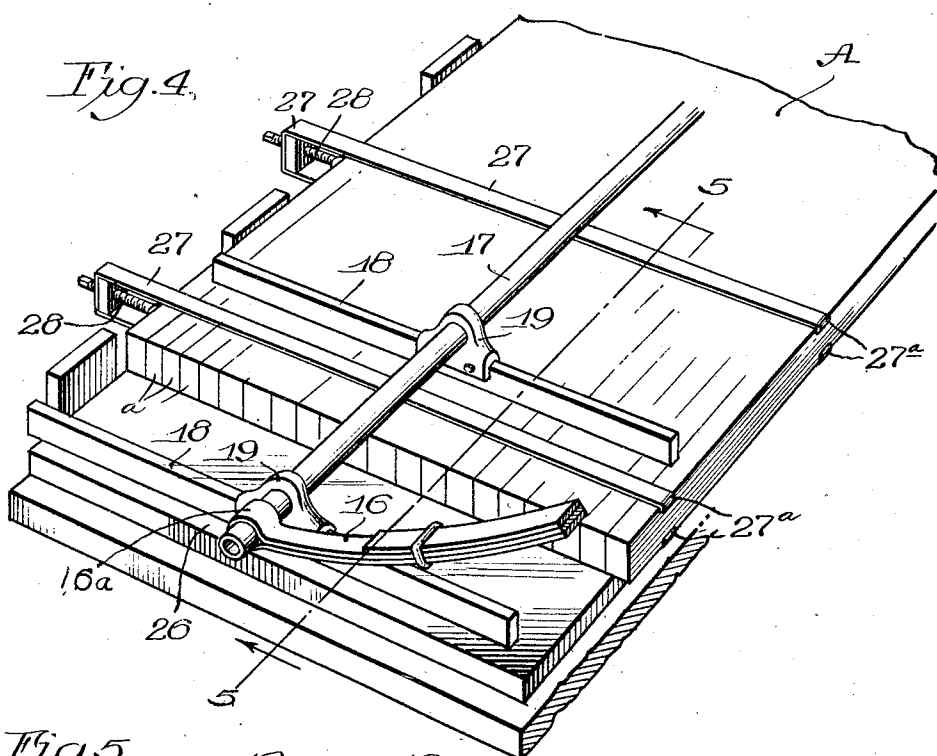
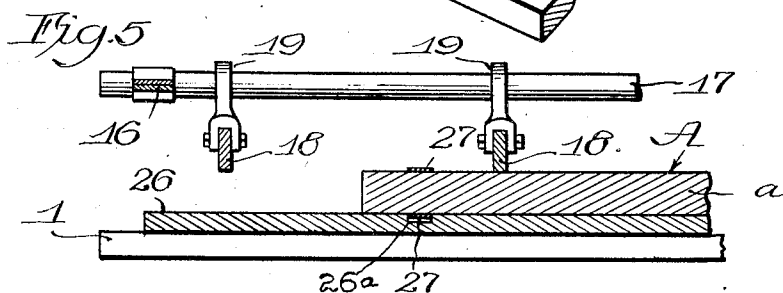
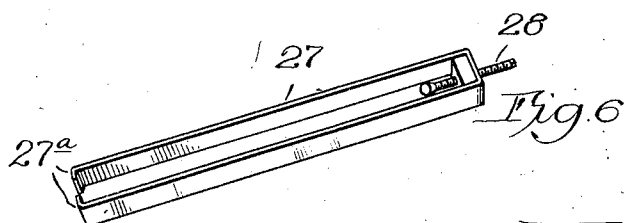
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POWER CLAMP

Filed May 6, 1927

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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POWER CLAMP.

Application filed May 6, 1927. Serial No. 189,446.

This invention relates to improvements in power clamps, and more particularly to clamps designed for use in the fabricating of composite materials, such as cores for veneered lumber, or other material consisting of pieces which are glued together.

The object of the invention is to provide a clamp in which the pressure is applied to the material in two directions simultaneously, thereby preventing the displacement, warping or bulging of the material due to excessive pressure in one direction.

In the accompanying drawings, I have disclosed a preferred type of power clamp and its application is that of manufacturing core material for doors and the like, this material having the form of planks made up of strips or short pieces of wood, set on edge and glued together face to face. However, the uses to which a power clamp may be put are numerous, including the assembly of many kinds of mill work where members are glued together.

In the drawings,
Figure 1 is a top plan view of the clamp with the material in place.

Figure 2 is a view of the clamp in end elevation before the power is applied.

Figure 3 is a view similar to Figure 2 showing the parts in clamping position.

Figure 4 is a perspective view of one end of the clamping table, showing the manner of applying the retaining clamps while the pressure is applied.

Figure 5 is a sectional view taken on line 5—5 of Figure 4.

Figure 6 is a perspective view of one of the retaining clamps.

Referring to the clamping device, the same comprises a flat table-like support for the material to be clamped, consisting of a bed 1 mounted on legs 2. Along one of the longer edges of the bed are a plurality of abutments 3 spaced apart at suitable intervals and projecting above the top face of the bed.

Along the opposite edge of the bed are supported the power cylinders 4—4 arranged horizontally with their axes extending parallel with and transversely of the bed 1. By preference, the cylinders are two in number located near opposite ends of the bed and suitably supported as by brackets 5—5 and otherwise bolted to the edge of the bed. Within the cylinders are pistons 6—6 and piston rods 7—7 extending through the

cylinder head just above the top of the bed.

Extending longitudinally of the bed 1, adjacent the cylinders, is a clamping bar 8, preferably of metal cast into a structural shape and consisting of a bottom plate 8^a and an upstanding flange 8^b along its forward edge. The bottom plate 8^a is gradually increased in width from its ends toward its center, as shown in Figure 1, and the flange 8^b is reinforced at intervals by integral cross ribs 8^c thus strengthening the bar against possible warping under the stress of the clamping pressure applied thereto. The ends of the piston rods 7—7 are connected to the clamping bars at points inwardly from the ends thereof, any suitable form of connection 9—9 being employed for delivering the thrust of the piston to the bar. The ends of the clamping bar extend a short distance beyond the ends of the bed, and on the underside of the bed are gibs 10 engaging the edges of the bed for guiding and maintaining the bar parallel with the abutments 3 at the opposite edge of the bed.

At each end and at the center of the clamping bar are mounted fixed journal bearings 11 in which is journaled a rock-shaft 12, the latter extending the full length of the bar just above and slightly behind the flange 8^b. At the extreme ends of the shaft 12 are keyed rocking levers 13—13 extending in a general downward direction to a point slightly below the bed 1. At the lower ends of these levers are elongated slots 13^a which ride on two fixed pins 14—14 mounted on the underside of the bed and projecting endwise therefrom at a predetermined distance forwardly from the edge of the bed on which the cylinders 4—4 are mounted. Also keyed to the rock shaft 12 are upwardly projecting brackets 15, there being three of these brackets shown, one just inwardly from each of the end bearings 11 and one at the middle of the shaft adjacent the center shaft bearing 11.

These brackets are slotted crosswise to form mountings for three spring arms 16 extending in a general horizontal direction toward the abutment edge of the bed, the length of these arms being substantially one-half the distance between the clamping bar and the opposite or abutment edge of the bed. These spring arms 16 are made up of several superimposed spring leaves not unlike the ordinary cantilever type of automotive spring. At their rear or fixed ends they

are clamped in the brackets 15 by means of clamping screws 15^a for lengthwise adjustment. The outer or free ends of the spring arms are shaped to form eyes 16^a which support a shaft 17. At intervals along the shaft 17 are mounted pressure bars 18 extending transversely of the shaft and the same direction on opposite sides thereof. A center bracket 19 is fixed to each pressure bar and the bracket loosely journaled on the shaft 17 so that it can turn freely thereon. This is perhaps the preferred arrangement, although the shaft 17 could as readily be made to turn freely in bearings at the ends of the spring arms, and the pressure bars fixed to the shaft. However, the preferred construction permits a more flexible action as the pressure bars are free to oscillate independently of each other.

The pistons are actuated either by air or fluid pressure, as heretofore stated, the air or liquid being conducted to the cylinders through sets of pipes 20 and 21, one leading to the rear or head end and the other to the front or piston rod end. The pipes connect with a four-way valve 22 to which supply and return pipes 23 and 24 also lead from a suitable source of supply, the valve being controlled by a suitable hand or foot-operated lever 25. The action of the cylinders is manifestly to shift the clamping bar transversely of the bed, applying pressure in one direction and releasing the pressure in the opposite direction.

For the purpose of illustrating the action of the clamping device, a plank A is shown on the bed in position to be clamped. The plank is made up of a multiplicity of thin strips *a* which have been glued together and the plank placed on the bed to be clamped before the glue dries and sets. The plank is placed with one edge in contact with the abutments 3, and the opposite edge near the clamping bar which has been withdrawn, as in Figures 1 and 2, to its releasing or starting position, namely, with the pistons forced rearwardly in their cylinders and the pressure bars 18 elevated above the plank.

From this position, the clamping bar is brought forwardly into contact with the adjacent edge of the plank, applying pressure edgewise or horizontally by a direct thrust from the cylinders. Accompanying the movement of the clamping bar there is also a downward swinging movement of the pressure bar 18 into contact with the top face of the plank, which is imparted to the same by the rocking movement of the shaft 12 and the spring arms 16, the rocking movement being due to the turning of the levers 13 about the fulcrums or fixed pins 14 at their lower ends as the clamping bar is moved forwardly.

The pressure applied to the top of the plank A is of a yielding character due to the

spring arms 16, so that after the pressure bars have come to rest on the plank, any further movement of the clamping bar is taken up by the spring arms, which assume a curvilinear shape, as shown in Figure 3. In this way, a certain degree of flexibility is introduced into the mechanism so that the amount of edgewise thrust on the plank is not opposed by the pressure bars acting against its face. In other words, the edgewise pressure may greatly exceed the flatwise pressure, and the maximum force of the former brought into play without materially increasing the latter. This, of course, is as it should be since the function of the pressure bars is to exert only sufficient pressure on the plank to prevent it from buckling or warping by the force of the edgewise pressure, these pressures being at all times proportional although not equal.

In practice, it is preferable to employ a caul 26 and retaining clamps 27 in connection with the clamping device, as shown in Figures 4 to 6. The caul is a board or plank having a plurality of transverse grooves 26^a on one face and spaced apart at intervals. The caul is placed on the bed and the plank A on top of it. The retaining clamps 27 are long U-shaped members made of strap iron and of a size to embrace the panel crosswise, the free ends of the clamp being bent to form fingers 27^a which hook over the edges of the plank. These clamps lie in the grooves 26^a in the top side of the caul and at their outer end is a screw 28 adapted to abut edgewise against the opposite edge of the plank.

The plank would ordinarily be assembled on the caul with the retaining clamps applied, before it is placed in the clamping device, and while under pressure the retaining clamps are tightened so that on releasing the clamping pressure, the retaining clamps continue to hold the plank under pressure, thus permitting it to be removed before the glue has dried and set, and another plank inserted.

Having described a preferred embodiment of my invention, I claim:

1. A power clamp comprising a bed, a clamping bar mounted for edgewise sliding movement adjacent one edge of said bed, a cylinder mounted adjacent said clamping bar, a fluid-actuated piston in said cylinder having direct connection with said clamping bar, a rock shaft journaled on said clamping bar, resilient arms fixed to said rock shaft, pressure bars mounted at the ends of said arms and above said bed, and a lever arm fixed to said rock shaft and having pivotal connection with said bed.

2. A power clamp comprising a bed having abutments at one edge, a clamping bar mounted for edgewise sliding movement adjacent the opposite edge of said bed, a cylinder mounted adjacent said clamping bar, 130

a fluid-actuated piston in said cylinder having direct connection with said clamping bar, a rock shaft journaled on said clamping bar, resilient arms fixed to said rock shaft, a shaft supported at the free ends of said arms and extending above said bed, a plurality of pressure bars mounted on said shaft, a lever fixed at one end to said rock shaft, and a fixed pin having pivotal connection with the free end of said lever.

3. A power clamp comprising a bed, a clamping bar mounted for edgewise sliding movement adjacent the opposite edge of said bed, a cylinder mounted on said bed adjacent said clamping bar and having a fluid-actuated piston operatively connected with said clamping bar, a rock shaft journaled on said clamping bar, resilient arms fixed to said rock shaft and extending above said bed, a plurality of oscillating bars mounted at the ends of said arms, and means operatively connecting said rock shaft with said clamping bar.

4. A power clamp comprising a bed having abutments at one edge, a clamping bar mounted for edgewise sliding movement adjacent the opposite edge of said bed, a cylinder mounted adjacent said clamping bar and having a fluid-actuated piston operatively connected with said clamping bar, a rock shaft journaled on said clamping bar, resilient arms fixed to said rock shaft, a shaft supported at the free ends of said arms and extending above said bed parallel with said rock shaft, a plurality of pressure bars journaled on said shaft, a lever fixed at one end to said rock shaft and depending toward said bed, and a fixed pin on said bed and having pivotal connection with the free end of said lever.

5. In a power clamp comprising a bed, a clamping bar movable edgewise on said bed, means for actuating said clamping bar, a rock shaft mounted on said clamping bar, an arm carried by said rock shaft and positioned adjacent said bed, and means for imparting an oscillary movement to said shaft to swing said arm toward and from said bed in the movement of said clamping bar.

6. A power clamp comprising a bed, a clamping bar movable edgewise on said bed, means for applying pressure to said

clamping bar, a presser bar mounted on said clamping bar and positioned above said bed, and means operative in the movement of said clamping bar to actuate said presser bar.

7. A power clamp comprising a bed, a clamping bar movable edgewise on said bed, means for applying pressure to said clamping bar, a presser bar positioned above said bed, a rocker arm mounted on said clamping bar and carrying said presser bar at its free end, and a lever arm connected with said rocker arm and fulcrumed on said bed for actuating said presser bar in the movement of said clamping bar.

8. A power clamp comprising a bed adapted to support material to be clamped on the top thereof, a power operated clamping bar mounted on said bed and shiftable edgewise thereof, a presser bar mounted above said bed, a support for said presser bar mounted on said clamping bar including a rocker arm, and means for imparting a rocking motion to said arm in the movement of said clamping member.

9. A power clamp comprising a bed adapted to support material to be clamped on the top thereof, a clamping bar mounted on said bed and shiftable edgewise thereof, power operated means for shifting said clamping bar, an arm journaled on said clamping bar, a presser bar journaled at the end of said arm and positioned above said bed, and a lever connected with said arm and having pivotal connection with said bed, whereby said arm is actuated to depress and release said presser bar in the shifting of said clamping bar.

10. A power clamp comprising a bed adapted to support material to be clamped, a clamping bar mounted on said bed for edgewise movement, a rock shaft journaled on said clamping bar, an arm fixed to said shaft, a presser bar journaled at the end of said arm and positioned above said bed, and a lever mounted on said rock shaft and fulcrumed on said bed, whereby said presser bar is depressed and elevated in the forward and retractive movement of said clamping bar.

Signed at Dubuque, Iowa, this 28th day of April, 1927.

EMIL C. LOETSCHER.