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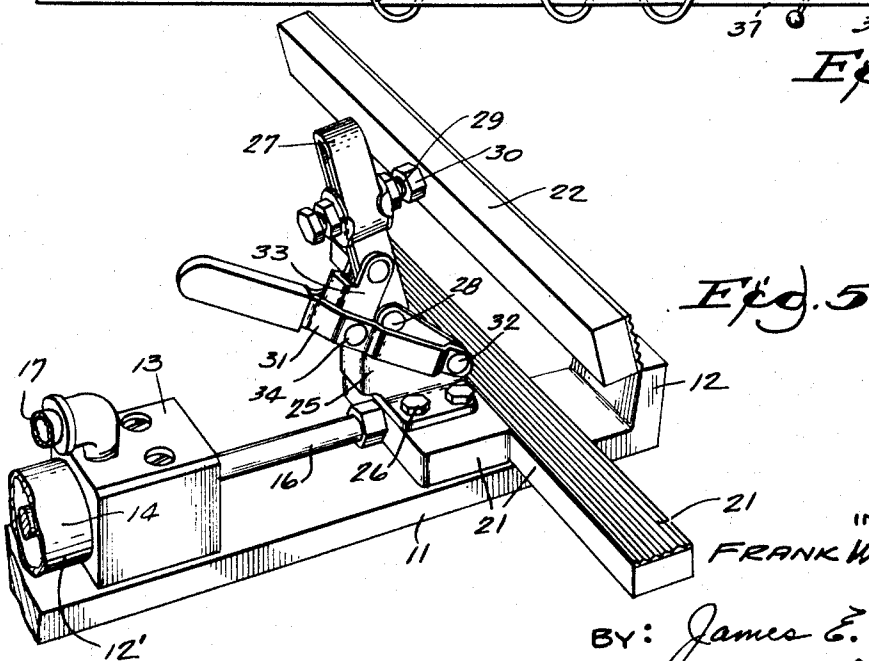
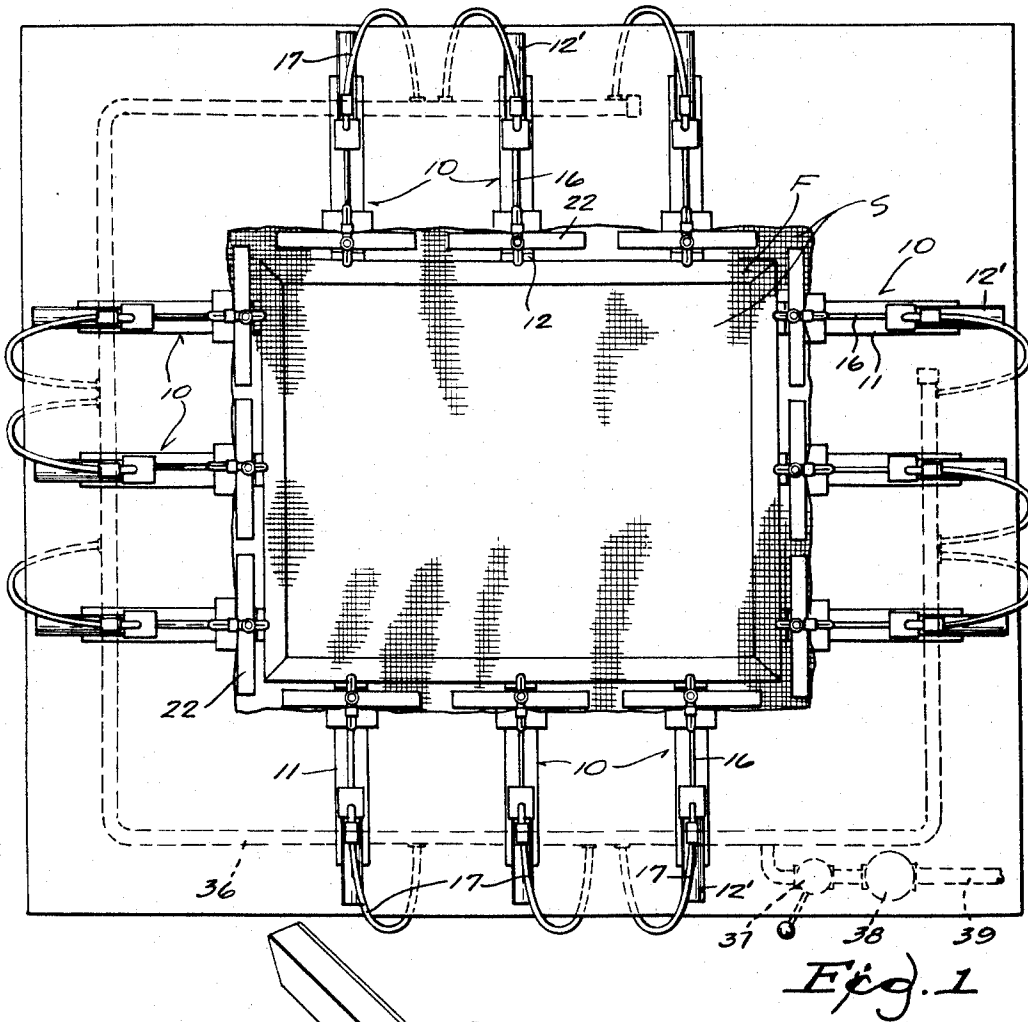
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SCREEN STRETCHER FOR PRINTING APPARATUS

Filed Dec. 12, 1966

2 Sheets-Sheet 1



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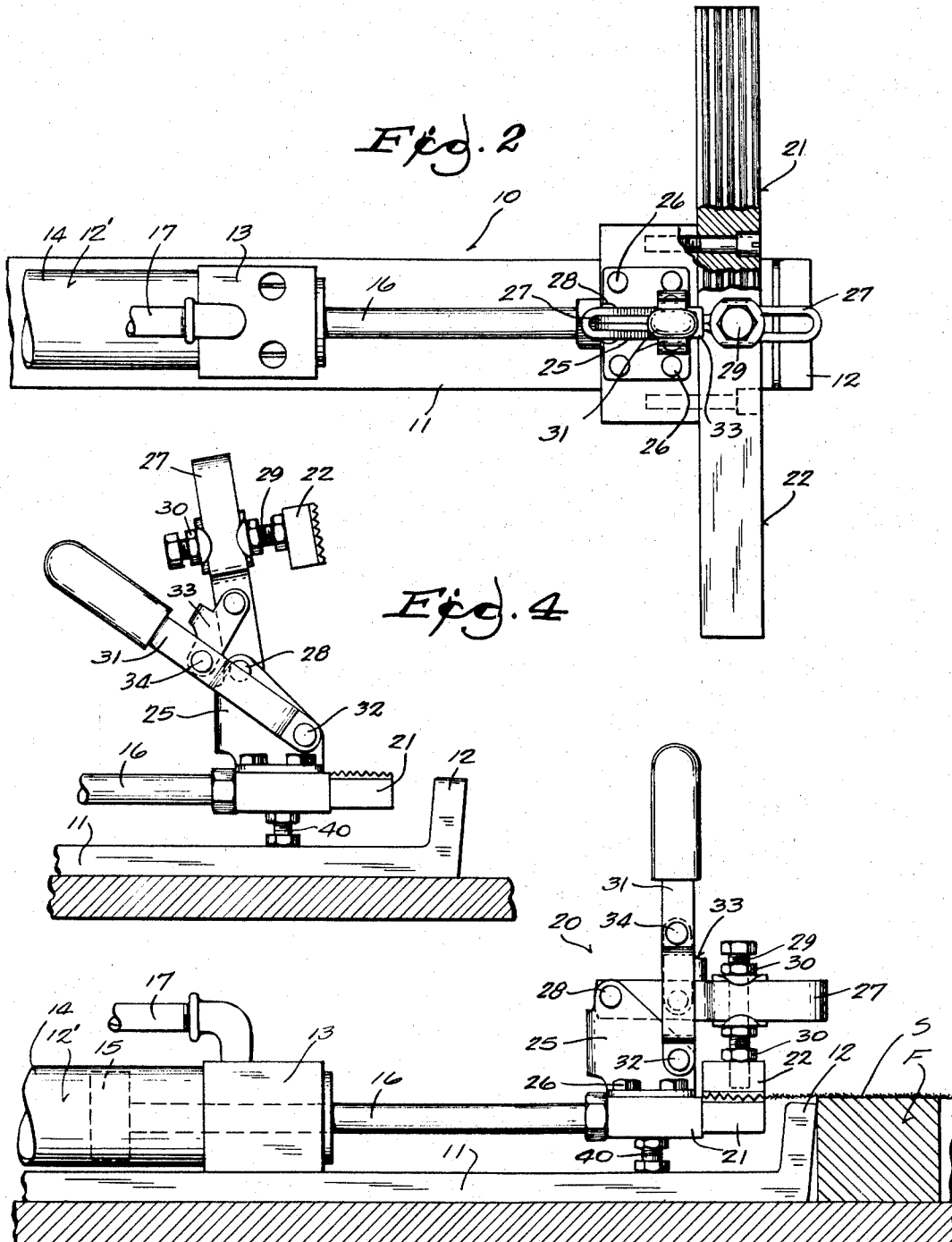


Fig. 3

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SCREEN STRETCHER FOR PRINTING APPARATUS

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ABSTRACT OF THE DISCLOSURE

Silk screen printing apparatus having clamping means for uniformly and tightly stretching the screen over its frame by exerting a balancing pushing force on the screen while pulling on the screen with a plurality of hydraulic cylinders arranged around the frame.

Prior art

In printing of the type to which the present invention relates, in order to obtain good printing results, it is necessary to have the screen stretched tightly over the frame with uniform tension throughout the sheet in all directions. These frames are usually rectangular in shape and made of wood, and in prior art devices, one of the main problems is due to the inherent flexibility or give in the frame itself which results in slackness in the screen after it has been stretched over the frame, then fastened down all around the frame, and the screen tensioning means then released.

Hydraulically actuated or other power devices have been used for applying the proper tension to the screen preparatory to fastening the screen down on the frame, but these devices have not proved satisfactory for a number of reasons. For example, in addition to the loosening of the fastened screen, due to the flexibility of the frame, these devices did not apply uniform tension throughout the screen and furthermore some of the clamping devices were difficult and time consuming to operate. This was a considerable problem when a substantial number of these clamps were used for stretching and fastening each sheet, and many sheets per hour had to be prepared.

Summary of the invention

Accordingly, it is an object of this invention to provide improved push-pull means located around the frame for stretching a printing screen to be fastened to a frame and at the same time eliminating or compensating for the flexibility or "give" in the frame itself. The push-pull means includes clamp mechanisms for pulling the screen and a base for pushing against the frame. Consequently, the screen is properly and evenly tensioned throughout its length and width and the frame at the same time is prestressed so that when the clamping means is removed after the screen has been fixed to the frame, the proper amount of tension remains throughout the screen.

Another more limited aspect of the invention relates to improved clamping means which are quickly and easily made to grasp and pull the screen while the base abuts in proper relationship to the frame; all means are simultaneously activated to tension the screen and prestress the frame, and then the clamping mechanisms are easily removed after the screen has been secured to the frame.

These and other objects and advantages will appear hereinafter as this disclosure progresses.

The drawings

FIGURE 1 is a plan view of a screen stretching apparatus embodying the present invention;

FIGURE 2 is a plan view of one of the mechanisms

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as shown in FIGURE 1, but on an enlarged scale, and certain parts shown in section or broken away for clarity;

FIGURE 3 is a side elevational view of the device shown in FIGURE 2 and when in use;

FIGURE 4 is a view of a portion of the device of FIGURE 3 but showing the clamp in the released position;

FIGURE 5 is a perspective view of the FIGURE 4 mechanism.

Description of the preferred embodiment

Referring in greater detail to the drawings, the frame F is of rectangular shape and is usually made of wood. Even in frames of relatively small size, there is a certain amount of flexibility or give along the length of its sides. The screen S is pulled tightly around all of its sides and over the frame, and is then fastened securely to the frame for use in silk screen printing or the like. The screens may be made of various materials, such as nylon, stainless steel, or other material. Considerable force must be exerted on all sides of the sheet in order to pull it very tightly over the frame, eliminate all wrinkles from the screen and make it completely smooth and taut.

In accordance with the present invention, a series of push-pull means 10 are positioned around the frame which not only pulls the screen tightly over the frame but simultaneously exerts a counter or balancing pressure on the frame to equalize the tension in the screen and frame at all points. These means can be instantly applied or released with a minimum of time and effort.

No special work surfaces or tables are required for using the present invention but it can be used on any flat surface, including the floor.

The push-pull means 10 each include a base 11 which can be set loosely on the table, floor or other surface, and any number of these means may be used, depending on the size of the screen. The front end of the base 11 has a bearing plate 12 fixed thereto which is adapted to abut or bear against the frame F. An air operated cylinder-piston means 12' is rigidly fixed to the base by the mounting block 13 and includes a cylinder 14 which has a piston 15 slidable therein to which is secured the piston rod 16. Air under pressure is supplied via conduit 17 to the rod end of the cylinder so that pressurizing of the single acting cylinder causes retraction of the piston rod 16 and pulling of the screen, as will appear.

A quick acting over-center clamp 20 is secured to the free end of piston rod 16 and includes a lower jaw 21 and a swingable upper jaw 22. These jaws have corrugated rubber surfaces which cooperate with one another to firmly grasp the screen therebetween. The means for opening and closing jaw 22 relative to jaw 21 is as follows.

Extending upwardly from the lower jaw 21 is a bifurcated standard 25 which is fixed by bolts 26 to the lower jaw. At the upper end of this standard a lever 27 is pivoted at 28 for swinging between the lower, clamping position shown in FIGURE 3 and the released position shown in FIGURE 4. The upper jaw 22 is adjustably fixed on an arm 27 by bolt means 29 having adjusting nuts 30 thereon.

The clamp 20 also includes an operating lever 31 pivoted at 32 to the lower, front side of standard 25. A link 33 is then pivotally connected between arm 27 and intermediate the length of lever 31 as at 34.

When the clamp is in the dead or over-center position shown in FIGURE 3, the jaws 21 and 22 tightly grip the screen, and the front end of the base, namely plate 12, bears against the frame. When all of the clamps have been so positioned around the screen and frame, compressed air is admitted to all cylinders causing the screen to be pulled and evenly tightened in all directions and a counter acting force applied to the frame via the bases 11. Thus

each push-pull means 10 acts on both the screen and the frame with equal effort. For example, the means 10 which is located midway between the length of a side of the frame will cause more inward deflection of the frame member than will a means 10 acting near the corner of the frame. However, the combined push-pull force of each means 10 is the same as any other means, all cylinders receiving the same amount of air pressure from the same source (not shown) through a common manifold 36, on-off, manually operated valve 37, regulating valve 38 and conduit 39. The result is a completely even tensioning of the screen throughout its entire area.

Bolt means 40 attached to the lower jaw 21 act to support the jaw in its sliding movement on the base 11.

After the screen has been fastened to the frame by any suitable, conventional means (not shown), the clamps are removed simply by swinging the lever 31 to the rear position shown in FIGURE 4 which causes the link 33 to pull the arm 27 and jaw 22 upwardly, freeing the screen.

The push-pull means 10 need not be set with any exacting degree of accuracy relative to the frame or to each other, because the air pressure in the cylinder will cause the clamp to line up properly and apply the correct amount of force.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. Screen stretcher apparatus for stretching a screen over a generally rectangular and flat frame for subsequent fastening of the screen to the frame, said apparatus comprising a plurality of hydraulically actuated push-pull means located in spaced relationship around the outside of said rectangular frame for disconnected abutment therewith, said means each including a clamp for quick attachment to and detachment from the screen for pulling the latter, said means also including a base for abutting against said frame and exerting a pushing force thereagainst and simultaneously with said pulling of said screen by said clamp, said base extending beyond said clamp whereby the screen can be pulled over said frame, whereby the combined push-pull force of each means is equal to the combined push-pull force of each of the other means.

2. Apparatus as defined in claim 1 including a common source of pressure fluid for simultaneous actuation of said push-pull means.

3. Apparatus as defined in claim 1 wherein said clamps are of the quick-acting, dead-center type.

4. Apparatus as defined in claim 1 further characterized

in that said clamps each have a pair of quick acting jaws adapted to grip the screen, and said means each includes a fluid operated cylinder and piston means carried on said base and for pulling said jaws to stretch said screen while said base bears in pushing relationship on said frame, and over center lever means for actuating said jaws.

5. Apparatus as defined in claim 4 including a common source of pressurized fluid for said cylinders for simultaneous actuation of all cylinder and piston means.

6. A push-pull means for stretching a screen over a generally rectangular frame for subsequent fastening of the screen to the frame, said means having a base including a front end adapted to bear against said frame in unconnected relationship therewith, a pair of jaws adapted to grip the screen, a fluid operated cylinder and piston means fixed on said base and connected to said jaws for pulling said jaws to thereby stretch said screen while said base bears in pushing relationship on said frame, said front end extending beyond said pair of jaws whereby the screen can be pulled over said frame, and dead-center lever means for actuating said jaws.

7. Means as defined in claim 6 further characterized in that said cylinder and piston means includes a cylinder secured to said base and a piston rod on which one of said jaws is fixed.

8. Means as defined in claim 7 further characterized in that said dead-center lever means is mounted on said one of said jaws and is pivotally connected by a link to the other of said jaws.

9. Means as defined in claim 8 further characterized in that said one of said jaws is a lower jaw located adjacent said front end of said base.

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