

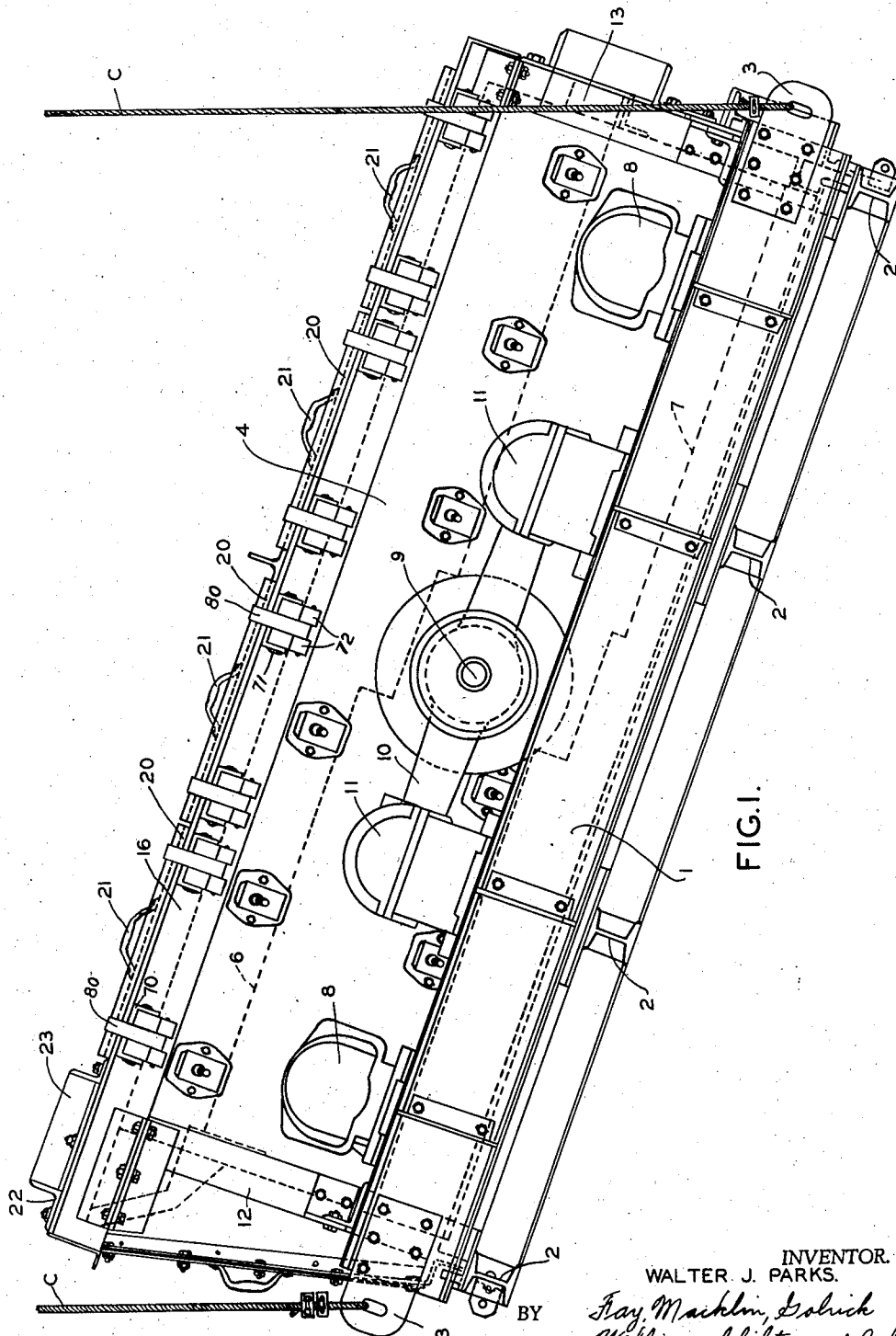
Aug. 15, 1944.

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2,355,890

CLOSURE FASTENER FOR SCREENING MACHINES

Original Filed Dec. 9, 1941 2 Sheets-Sheet 1



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2 Sheets-Sheet 2

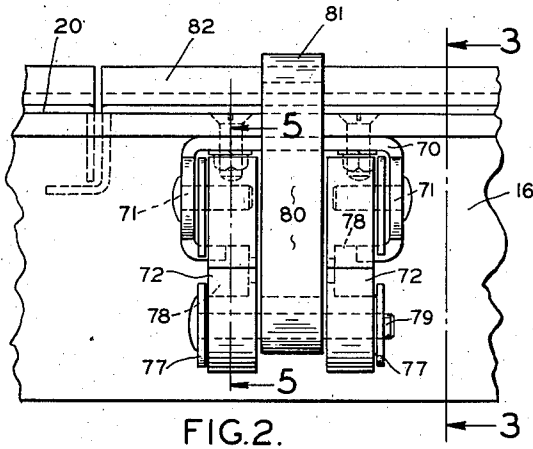


FIG. 2.

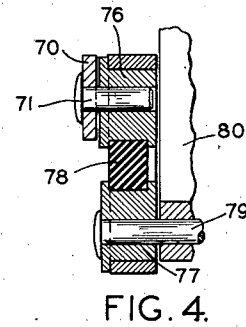


FIG. 4.

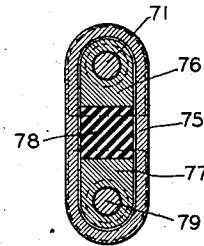


FIG. 5.

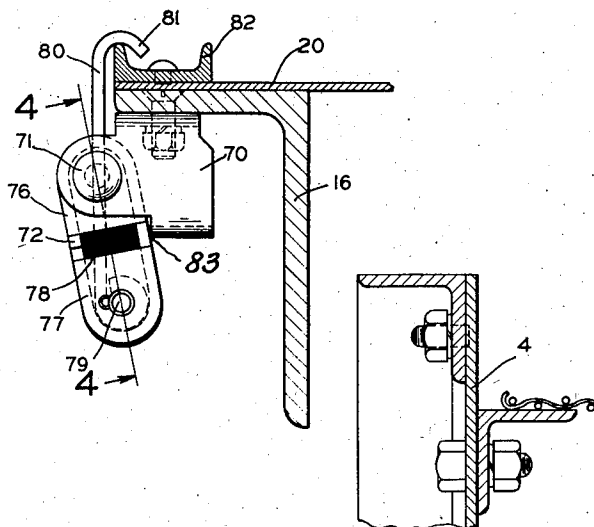


FIG. 3.

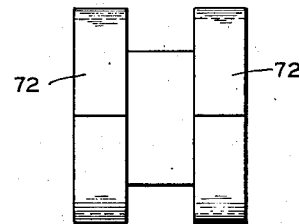


FIG. 6.



FIG. 7.

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UNITED STATES PATENT OFFICE

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CLOSURE FASTENER FOR SCREENING MACHINES

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Original application December 9, 1941, Serial No.
422,256. Divided and this application June 23,
1942, Serial No. 448,149

5 Claims. (Cl. 292-114)

This invention relates, as indicated, to closure fasteners, but has reference more particularly to a closure fastener which is especially adapted for securing a cover to an air seal for a gyratory screen or the like.

In my copending application, Serial No. 422,256, filed December 9, 1941, of which the present application is a division, I have described a gyratory screen having associated therewith a novel enclosure or air seal, designed primarily to assist in controlling the flow of atmospheric air through the screen, whereby the dust in the material being screened is dampened and the discharge of such dust into the atmosphere about the screen is avoided.

For the purpose of facilitating access to the screen, the air seal, as described in said copending application is provided with removable cover plates, which are secured to the air seal by various forms of fasteners.

The present invention is concerned primarily with the novel form of cover plate fastener which is illustrated in Figs. 12 to 17 inclusive of the said copending application, which fastener is particularly advantageous in that it is self-locking, is easily and quickly opened and closed, and is capable of exerting a much greater clamping pressure in the closed position than the force necessary to close it. A further advantage lies in the fact that an operator of the screening machine is able to unhook the fastener by hand and without having to look around for some tool to give him a mechanical advantage to unhook it.

The invention will be more clearly understood by reference to the accompanying drawings, wherein

Fig. 1 is a side elevation of a screening machine in which the invention is incorporated;

Fig. 2 is a fragmentary elevational view, on an enlarged scale, showing the novel closure fastener in closed or locked position;

Fig. 3 is a cross-sectional view, taken on the line 3-3 of Fig. 2;

Fig. 4 is a cross-sectional view, taken on the line 4-4 of Fig. 3;

Fig. 5 is a cross-sectional view, taken on the line 5-5 of Fig. 2;

Fig. 6 is a front elevation of the link which forms a part of the closure fastener shown in Figs. 2, 3, 4 and 5, and

Fig. 7 is a top plan view of the link of Fig. 6.

Referring more particularly to the drawings, a gyratory screen, for which the closure fastener of the present invention is particularly adapted, consists essentially of a supporting base or frame,

and means for imparting a gyratory movement to the screen body. The base or frame, in this case, consists of a pair of transversely spaced base rails 1, in the form of I-beams, connected by a plurality of longitudinally spaced I-beams 2, the base rails having secured to the ends thereof plates 3, to which are secured cables C, whereby the base frame may be flexibly suspended, preferably in an inclined position, from any desired superstructure (not shown).

The screen body, in this case, which is disposed within the base frame, comprises a pair of transversely spaced side plates 4, which are disposed in planes parallel with but spaced inwardly of the base rails, and screens 6 and 7 which extend transversely of said side plates, the upper screen 6 being of coarser mesh than the lower screen 7. The screen body is resiliently mounted on the base rails, as by means of resilient supports generally indicated at 8, and is provided with a transversely extending shaft 9, which extends through the side plates and upon rotation of which a gyratory movement is imparted to the screen body. The shaft 9 is supported at its ends in gyratory supporting bodies 10, which, in turn, are resiliently mounted on the base rails, as by means of resilient supports generally indicated at 11.

The enclosure, or air seal, consists, in this case, of a rectangular frame mounted on the base of the machine in such a manner that restricted openings or clearances are formed between each member of the frame and the adjacent edge of the vibrating side plate of the screen body. Specifically, this rectangular frame consists of four upright angles, only two of which, designated 12 and 13, are seen in Fig. 1, and two longitudinally extending angles 16, only one of which is seen in this frame.

Mounted on the angles 16 of the enclosure or air seal are suitable cover plates 20, which are removable, as by means of handles 21, to permit access to the screen body, and a feed plate 22, the latter being mounted on a rearward extension of the angles 16, and having an opening 23 therein for feeding of the materials to be screened.

The cover plates 20 are preferably secured to the angles 16 by means of fasteners, which are shown most clearly in Figs. 2 to 7 inclusive. These fasteners are of the toggle type, and each fastener includes an inverted U-shaped bracket 70, which is bolted to the member 16, and forms a support for pins 71, upon which spaced links 72 in the form of endless straps, rigidly connected together at the back as shown in Figs. 6 and 7

to form a unit, are pivotally mounted. Each of these links forms a housing 75, which encloses spaced upper and lower metallic members 76 and 77 respectively, between which a compression member in the form of a block 78, of rubber or the like, is interposed. The members 77 are interconnected by means of a swingable pivot pin 79, to which is pivotally connected a fastener element 80 having a hook-like upper end 81 adapted to engage any element which it is desired to lock to the member 16. In this case, the end 81 is adapted to engage one of the flanges of a channel 82 which is riveted or otherwise secured to the margin of the cover plate 20.

The operation of the fastener may be described as follows:

Assuming that the fastener is in the locked position, as shown in Figs. 2, 3, 4 and 5, the following conditions exist. The resilient members 78 are in a compressed condition, with the members 77 away from the ends of the links 72, so that the pressure of the members 78 is exerted through the pin 79 to the element 80, which, in turn, exerts a clamping force to hold the cover 20 in place. The line of action of the force transmitted through the element 80 passes through the center of the pin 79 and through the point of contact of the hook 81 with the channel 82. Referring to Fig. 3, it is apparent that this line of action is to the right of the centerline of the pins 71, and so exerts a counterclockwise torque on the link 72, which, in turn, holds it firmly against the stop 83 on the bracket 70 and in the position shown for clamping down the cover 20. It is also apparent that in this position, the resilient force of the resilient members 78 holds the closure fastener firmly closed.

In order to open the fastener, it is necessary to pull on the bottom of the links 72 in an outward direction away from the angle 16 (Fig. 3), until the line of action of the element 80 passes through the center line of the pins 71. After this point has been passed, the resilient members 78 exert a clockwise torque on the links 72, and the fastener will spring open. As the bottoms of the links 72 move outwardly, the distance between the center line of the pin 79 and the point of engagement of the hook 81 with the channel 82 changes to such an extent that finally it becomes less than the length of the link and the element 80 releases itself from the channel 82, and it can be swung outwardly and downwardly until it hangs freely until again needed. In order to close the fastener, the operation is reversed.

It will be apparent from the foregoing description that a self-locking device has been provided which is easily and quickly opened or closed and which is capable of exerting a much greater clamping pressure than the force necessary to close it. In this, it has a great advantage over the ordinary spring type automobile hood fastener, in the use of which a force greater than the final clamping pressure is necessary to extend the spring element over the clamping surface and swing it over the edge of the member to be clamped. Moreover, it is an advantage for an operator of a screening machine of the type described to be able to remove the fasteners by hand, without having to look around for some tool to give him a mechanical advantage in unfastening the devices. In the operation of the ordinary spring type hood latch, the maximum pressure that can be exerted by the hook is the amount of force that a man can exert in pulling on the extension of the hook.

The device of the present invention has a further definite mechanical advantage. This advantage, possessed by the operator at any point in the operation of the device, is equal to the spring pressure exerted by the resilient members in the links, multiplied by the distance to the line of action of the hook element 80 from the center of the pins 71, divided by the distance from the center line of the pins 71 to the line of action of the opening or closing force, which may be assumed to be applied at the center line of the pin 79. The exact ratio of advantage can, of course, be governed by the design of the fastener, but for purposes of illustration, it has been found in one design that has been tested that the maximum force required to close the fastener is approximately one-fifth of the final locking force exerted by the fastener.

Another feature of the invention lies in the fact that the elements which carry the resilient members are in the form of closed links, with the resilient members within the links. This is a distinct advantage where the resilient members are in the form of rubber blocks interposed between the members 76 and 77 and filling the space between the sides of the links. Upon compression of these rubber blocks on the closing stroke, the blocks must be deformed to accommodate the decreased distance between the members 76 and 77, since the total volume of the rubber blocks, when formed of the ordinary structural grade of rubber, must remain constant. This deformation, with this construction, can occur in only one direction, the sides of the links constraining the rubber in one direction, so that the rubber becomes stiffer than it would normally be if the compression were accompanied by expansion in all directions, and the locking pressure for any given location of the element 77 is greater than it would be if the rubber was unrestrained. This permits a softer grade of rubber to be used than would otherwise be required if the restraint were not present. Also, inasmuch as the rubber blocks are inserted in the links under an initial compression, the use of a softer grade of rubber facilitates assembly of the fastener.

If coil or other types of steel springs, or a smaller block of rubber that did not expand to fill the link spaces, were used, this additional compressive force would not be present, and the unit would have to be designed accordingly for the required final locking force.

It is to be understood that the form of my invention, herewith shown and described, is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of my invention, or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. In a toggle locking device, a support, links pivotally mounted on said support, each of said links forming a housing having spaced walls, members disposed between said walls at the ends of the housings, resilient means between the members of each link, a pivot pin extending from the members at one end of each of the housings, and a fastener element extending from said pin.

2. In a toggle locking device, a support, links pivotally mounted on said support, each of said links forming a housing, members disposed in said housing at the ends thereof, resilient means between the members in each link, a pivot pin extending from the members at one end of each

of said housings and a fastener element extending from said pin.

3. In a toggle locking device, a support, a link mounted on said support, said link comprising spaced endless straps forming spaced housings, a movable member in each end of each housing, a resilient compressible element interposed between members in each housing and a latch member between said spaced housings and connected to the members in one end of said housings.

4. In a toggle locking device, a support, a link mounted on said support, said link comprising spaced endless straps forming spaced housings, a movable member in each end of each housing, a resilient compressible element interposed between the members in each housing and engag-

ing the walls of the housing so as to be deformable substantially only in the direction coincident with the long axis of the link, and a latch member between said spaced housings and connected to the members in one end of said housings.

5. In a toggle locking device, a support, a link, said link comprising an endless strap forming a housing, a movable member in each end of the housing, one of said members having means for pivotally mounting said link on the support, a resilient compressible element interposed between the members in the housing and a latch member connected to the other member in said housing.

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