

United States Patent [19]

[19]

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Hunnicutt

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[54] **FREELY POSITIONABLE FORCE DISTRIBUTING DEVICE**

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[51] Int. Cl. B21j 13/00

[58] **Field of Search**..... 72/705, 293, 301, 446,
248/346.1, 354 R, 352

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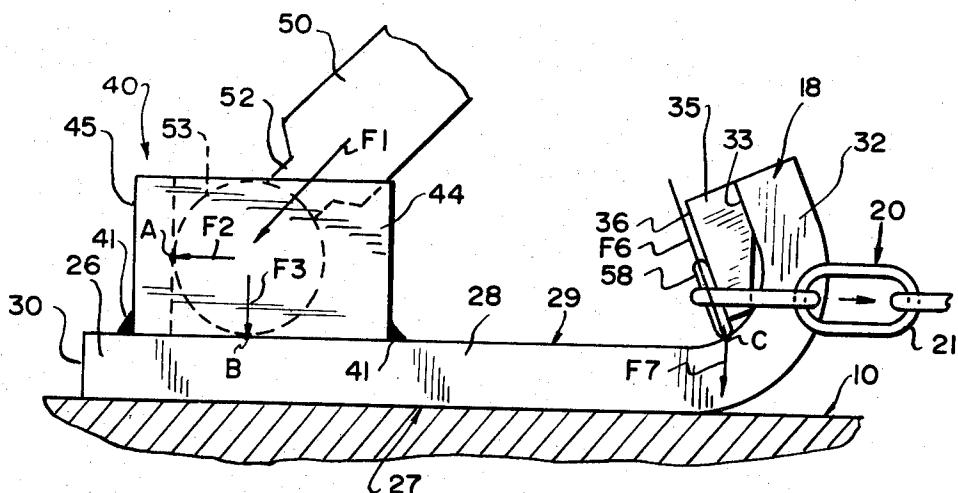
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ABSTRACT

A freely positionable force transfer device for receiving a power strut directing a force angularly downward toward a platform. The device is engaged by a flexible reactive member secured to the platform to maintain static equilibrium by directing the components of the applied force into the platform and to the reactive member.

6 Claims, 3 Drawing Figures



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FIG. 1

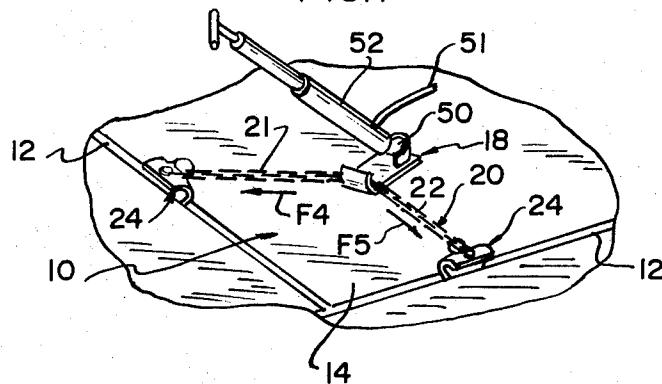


FIG.2

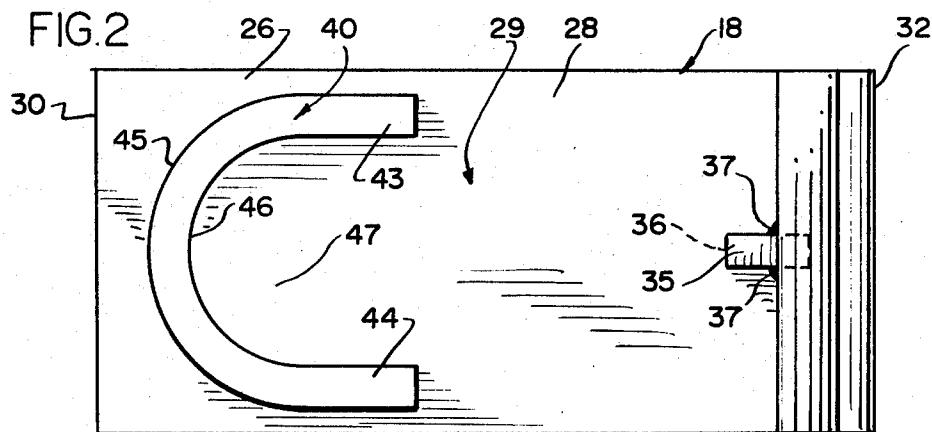
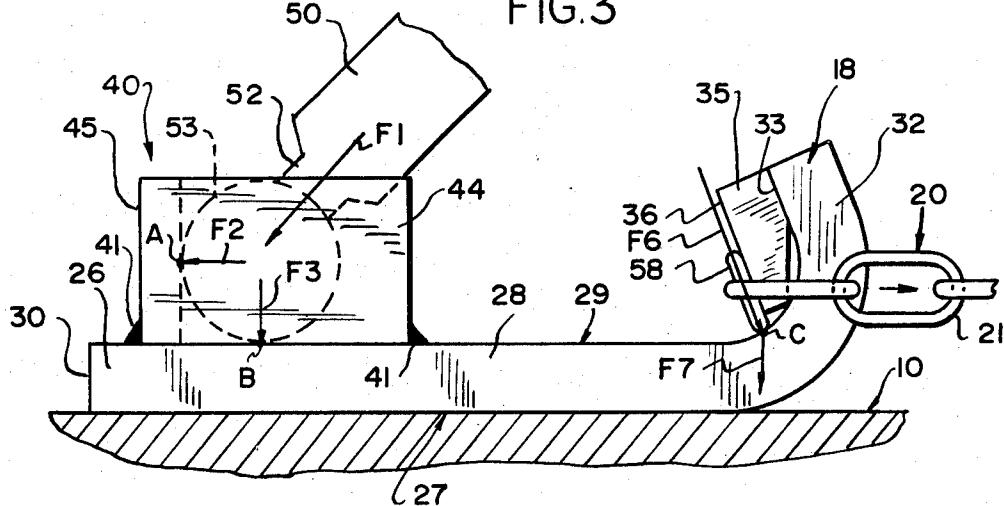


FIG. 3



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FREELY POSITIONABLE FORCE DISTRIBUTING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to and is adapted for use with apparatus for reforming and straightening members such as disclosed in co-pending U.S. Pat. application, Ser. No. 744,824, filed July 15, 1968, now U.S. Pat. No. 3,590,623 in the name of Wayne E. Hunnicutt et al., and reference is made thereto for the disclosure contained therein.

U.S. Pat. No. 3,590,623 discloses, in general, a platform comprising a grid pattern of channels imbedded in a concrete slab upon which, for example, a wrecked automobile is placed. Through various geometrical arrangements of force applying means, such as power driven rams acting upon rigid struts, together with flexible force transmitting means such as chains, forces in a plurality of directions and magnitudes can be obtained. The instant invention relates to apparatus for obtaining additional geometrical relationships to apply forces in selected directions and magnitudes on particular structural members.

While the apparatus disclosed in the above mentioned application is excellent for most situations, the grid pattern limits the force applying means positions along the channels of the platform.

The instant invention anchors and directs a force loaded strut from positions relative to the platform which are independent of the channel location and the grid pattern formed by those channels.

It is, therefore, an object of the invention to freely position a force applying member on the platform in an infinite number of operative positional arrangements.

Another object of this invention is to secure the force transfer device to the platform by a flexible reactive member to distribute the applied force directed angularly downward toward said platform.

Still another object of the invention is to stabilize the static equilibrium of the force distributing device by means of a flexible reactive member such as a chain in the form of a sling having each leg thereof secured.

A further object of the invention is to pivotally receive the force loading strut.

A still further object of the foregoing is to stabilize the force distributing device by creating a downward component of force at the contact point of the flexible reactive member to stabilize the angular relationship of the forces.

The foregoing and other advantages and features of the invention will become apparent from the following description of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the device in typical force distributing arrangement on the partially shown platform;

FIG. 2 is a plan view of the device; and

FIG. 3 is an elevational view of the device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a platform 10, comprising slotted channels 12 imbedded in a concrete slab 14 to form a grid pattern of anchor positions for

apparatus used for reforming and straightening members.

The instant invention, generally designated 18, is shown in typical operating position on the platform 10. A flexible reactive member, chain 20, engages the device 18 and forms a sling having legs 21 and 22 respectively. Each leg of the sling is spaced apart and secured to channels 12 by means of a clamp assembly 24 which is secureable in an infinite number of positions along the channels 12.

The platform 10, channels 12 and clamp assembly 24 are fully disclosed in the aforementioned patent number 3,590,623 and reference is made thereto for further details of that system disclosed therein.

As shown in FIGS. 2 and 3, the force distributing device 18 comprises a base plate 26 having a bottom flat surface 27 for bearing on the surface of the platform 10, and including a generally rectangular shape portion 28 defining an upper flat surface or platform 29 terminated at end 30. The opposite end of plate 26 is formed into an arcuate shape 32 depending from the rectangular shaped portion 28. The arcuate shaped end 32 includes an inwardly curving wall surface 33.

A gusset plate or lug 35 is centrally secured on the inner surface 33 of the arcuate portion 32 as by welds 37 best shown in FIG. 2. The gusset plate has a generally rectangular shaped cross section with an inner facing wall 36 inclined in a downward and outward direction.

A fence plate designated 40 is secured to the base plate 26 by welds 41 and comprises walls 43 and 44 each merging into an arcuate end part 45 having an inner arcuate surface 46. The fence plate 40 is disposed in spaced relation to arcuate shape end 32 and is centrally located from the sides of the rectangular shaped part 28 is substantial alignment with the gusset plate 35. It can be seen that the walls 43 and 44 and the arcuate end part 45 form a U-shaped cavity or space 47 open at the top and inner facing portions thereof.

Referring again to FIG. 1, it can be seen that the fence plate 40 is adapted to receive an end 50 of a power strut 52 such as a hydraulic cylinder connected to a hydraulic power source (not shown) by hose 51. The power strut 52 can directly engage a frame member as shown or be used in conjunction with other tension or compression transmitting mechanisms. The power strut 52 may be of any suitable known type such as a Porto-Power hydraulic ram manufactured by Blackhawk Manufacturing Company of Milwaukee, Wisconsin.

As shown in FIG. 3 the end 50 of the power strut 52 comprises a ball 53 formed at one end of the strut. The ball 53 is dimensionally complementary to the fence plate 40 in that it freely seats in the space 47 to pivot therein. To better illustrate the operation of the device, forces are indicated by arrows. A force, F1, produced by the power strut 52 and coaxial therewith is directed into the fence plate 40 and the base plate 26 at points A and B, respectively. The horizontal component, F2, of force F1 is directed into the fence plate 40 at point A, and the vertical component, F3, of force F1 is directed into the base plate 26 at point B. Since the flat bottom surface 27 is coextensive and contiguous with the flat surface of the platform 10 static equilibrium of the vertical component of force F3 results. The horizontal

component F2 is counteracted by the chain 20. The chain 20 is secured to channels 12 to form a sling which engages the arcuate shaped end 32.

More specifically, a typical link 58 of the chain 20 bears against the downwardly inclined wall 36 of the gusset plate 35. As the legs 21 and 22 reactively distribute the horizontal component F2 between them, the link 58 distributes the greater part of that force (F2) to the legs 21 and 22 as forces F4 and F5, respectively. As the link 58 reacts against the horizontal component F2, a downwardly angled component of force F6 results. This force is directed toward the platform due to the chain link 58 having a downward angular orientation as a result of the inclined wall 36 of the gusset 35. The chain link engages the inner surface 33 at point C resulting in a downward force component F7. This force, F7, biases that end of the base plate 26 into the platform 10 to maintain the entire flat surface 27 of the base plate 26 coplanar with the platform 10 thereby stabilizing the angular relationships of the forces during operation. Therefore, the algebraic sum of the forces F4, F5 and F7 is essentially equal to the horizontal component F2.

It can be seen from the foregoing that the instant invention provides a force distributing device having inherent stabilizing characteristics which are important when large forces are employed as in frame reforming and straightening; the device has the versatility of being freely positionable at any place on the platform 10 notwithstanding the locations of securing channels.

While the invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention.

I claim:

1. A freely positionable force distributing apparatus operable on a platform with a force producing power strut and a reactive member, comprising

a base plate having a bottom surface to bear on a platform,

a U-shape retaining cavity mounted on said base plate operative to receive a force producing power strut and effective to divide downwardly directed forces produced by said strut into horizontal and vertical components, and

anchoring means disposed in spaced relation to said retaining cavity and operative to engage a reactive member anchoring the device on the platform,

said anchoring means comprising an upturned end portion of said base plate having an inner facing surface of said upturned end portion with a centrally disposed lug to retainably engage said reactive member.

2. In an apparatus for reforming bodies and frames of vehicles including a force producing power strut and a platform having a plurality of force reactive members selectively locatable thereon, the improvement comprising

a freely positionable force distributing device having a base member defining a bearing surface, retaining means carried by said base member operative to retain a strut directing a downward force on said member,

said retaining means comprising a U-shaped member defining a cavity for pivotally retaining a power strut effective to divide the downward force applied by a strut into horizontal and vertical components acting on said member, and

anchor means carried by said base member for connecting a reactive member therewith to counteract said horizontal component of force thereby anchoring said device to the platform, said anchor means including an upturned end portion of said base member having an inwardly disposed element with a downwardly inclined inner surface to engage said reactive member to produce a downwardly directed force component biasing the base member against the platform when said element is engaged by the reactive member.

3. A freely positionable force distributing apparatus operable on a platform with a force producing power strut and a reactive member, comprising

a base plate having a bottom surface to bear on a platform,

a retaining member mounted on said base plate comprising a U-shape cavity to receive a force producing power strut and aligned with said anchoring means effective to divide downwardly directed forces produced by said strut into horizontal and vertical components, and

anchoring means disposed in spaced relation to said retaining member and operative to engage a reactive member anchoring the device on the platform, said anchoring means comprising an upturned end portion of said base plate having an inner facing surface with a centrally disposed lug having a downwardly inclined wall facing said cavity and in alignment therewith to create a downward component of force for stabilizing that portion of the base plate retainably engaging said reactive member.

4. A freely positionable force distributing apparatus operable on a platform with a force producing power strut and a reactive member, comprising

a base plate having a bottom surface to bear on a platform and an end thereof extending upwardly from said bottom surface,

a retaining member comprising a U-shape element carried by said base plate extending parallel thereto and forming an abutment extending along two sides and an end thereof operative to receive a force producing power strut and effective to divide downwardly directed forces produced by said strut into horizontal and vertical components, and

anchoring means carried by said upwardly extending end of said base plate disposed in spaced relation to said retaining member and operative to engage a reactive member anchoring the device on the platform.

5. A freely positionable force distributing apparatus operable on a platform with a force producing power strut and a reactive member, comprising

a base plate having a bottom surface to bear on a platform,

a retaining member comprising a U-shape element carried by said base plate extending parallel thereto and forming an abutment extending along two sides and an end thereof operative to receive a

force producing power strut and effective to divide downwardly directed forces produced by said strut into horizontal and vertical components, anchoring means disposed in spaced relation to said retaining member and operative to engage a reactive member anchoring the device on the platform, said anchoring means comprising the end of said base plate opposing the end along which said abutment extends turned to extend outwardly from the

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bottom surface thereof in the same direction as said abutment.

6. The apparatus of claim 5 wherein said anchoring means further includes a lug having a bearing surface extending parallel to a portion of the outwardly turned end of said base plate to engage a flexible force transmitting means thereby applying a bearing force to anchor said base plate.

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