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3,340,720 9/1967 Chartier 72/705

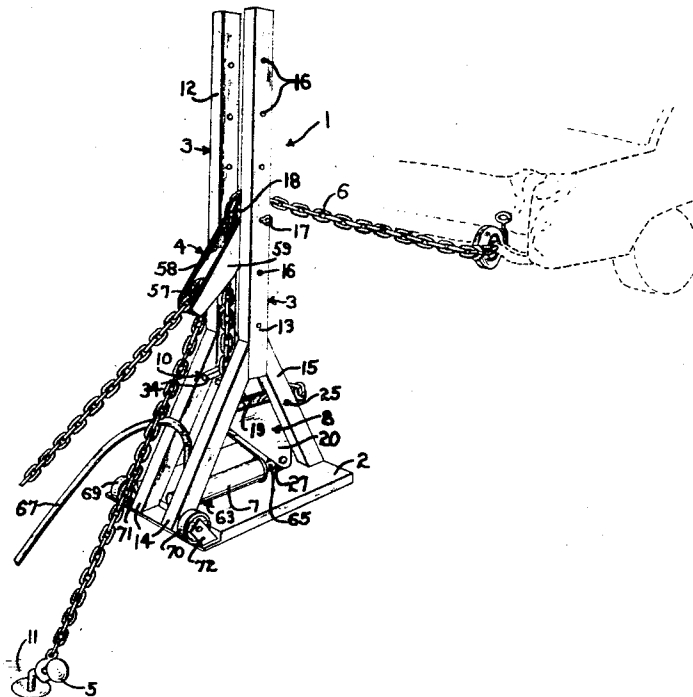
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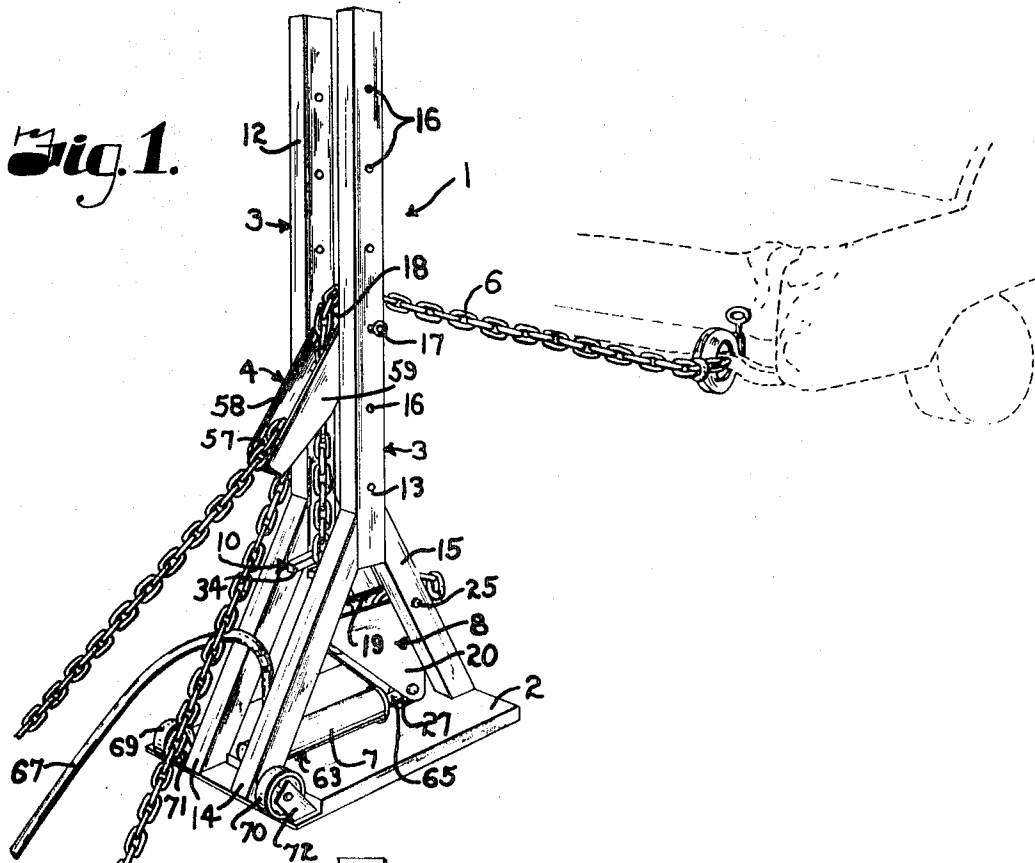
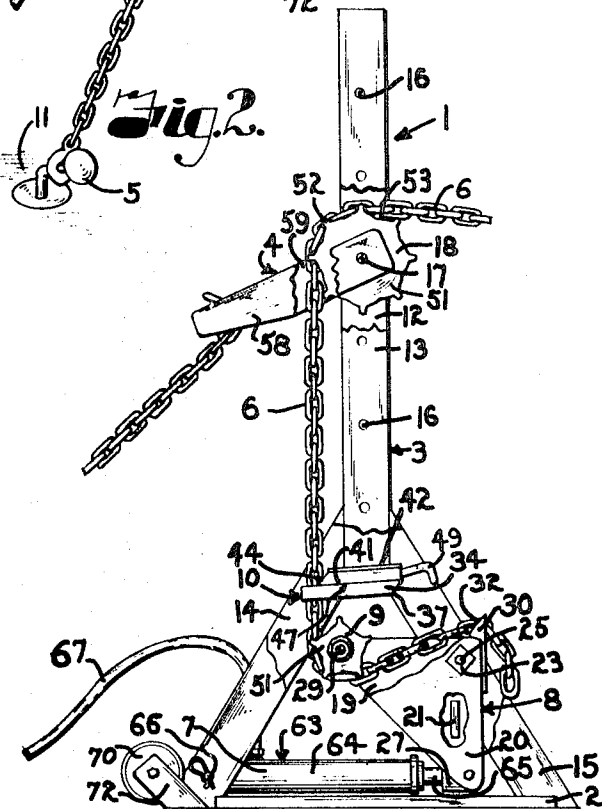
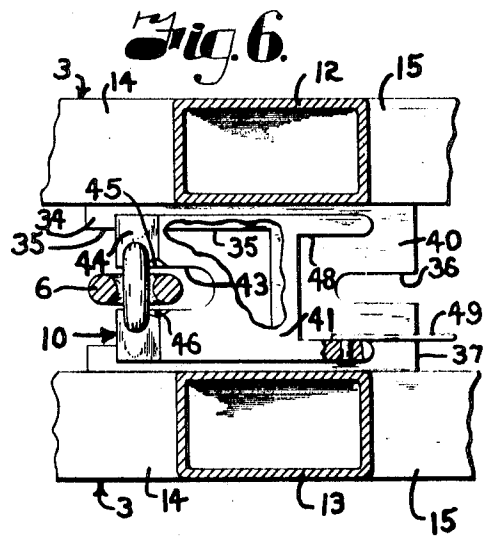
[54] **PORTABLE APPARATUS FOR APPLYING A PULLING FORCE TO STRUCTURES**
 11 Claims, 7 Drawing Figs.

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 72/293, 72/705
 [51] Int. Cl. B66f 3/24,
 B21d 41/02
 [50] Field of Search 72/305,
 293, 705; 254/1, 124, 127

[56] **References Cited**
UNITED STATES PATENTS
 2,442,604 6/1948 Johnson et al. 72/705
 2,979,102 4/1961 Ferguson et al. 72/705
 3,338,083 8/1967 Eck 72/305

ABSTRACT: A portable apparatus for applying a pulling force to structures includes a base member having a standard mounted thereon and upstanding therefrom with the standard being connected to an anchor spaced from the base member. An extensible member has one end thereof pivotally connected to a fixed point relative to the base member and the other end pivotally connected to a lower portion of a leverage arm having an intermediate portion thereof pivotally mounted on the standard and a guide member is rotatably mounted on an upper portion of the leverage arm. A flexible member has one end secured to a selected portion of the structure to receive the pulling force and the other end fixedly connected relative to the standard with an intermediate portion of the flexible member engaging the guide member whereby extension of the extensible member moves the leverage arm and the guide member mounted thereon to effect a pulling force in the flexible member thereby applying a pulling force to the structure.





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Fig. 3.

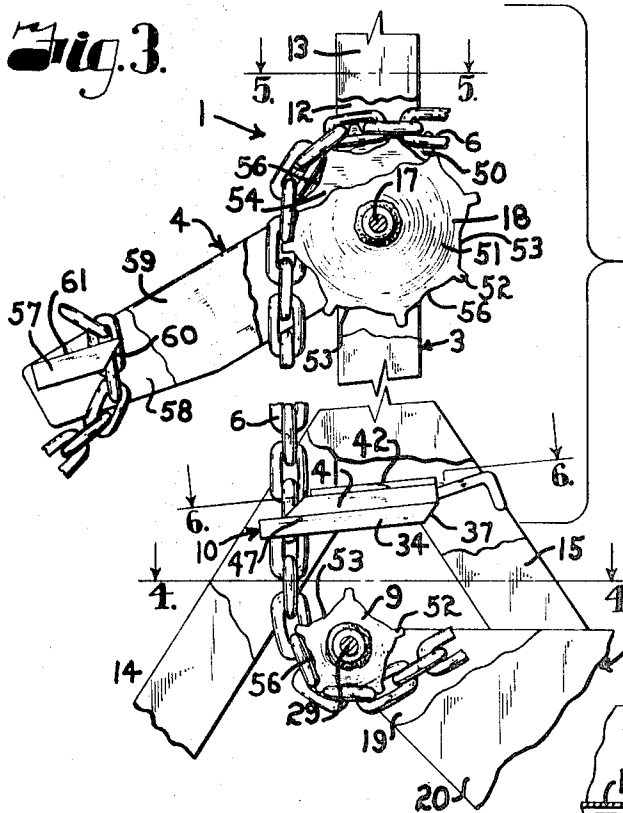


Fig. 7.

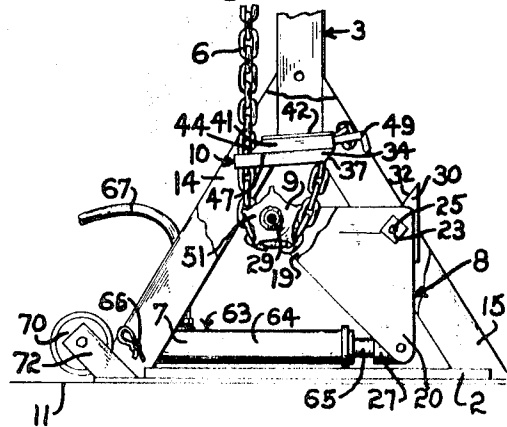


Fig. 4.

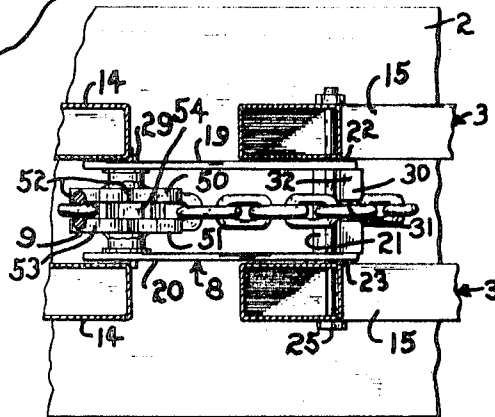
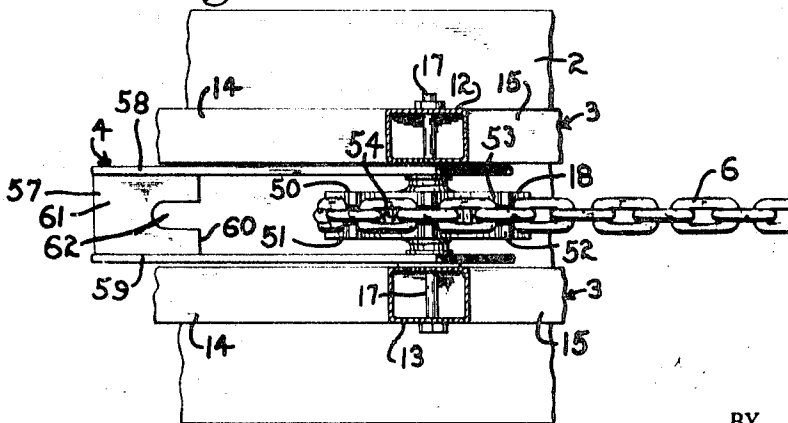


Fig. 5.



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PORTABLE APPARATUS FOR APPLYING A PULLING FORCE TO STRUCTURES

The present invention relates to an apparatus for applying a pulling force to structures and more particularly to such an apparatus for reshaping damaged portions of automobile frames, panels, and the like.

The principal objects of the present invention are: to provide an apparatus for applying a pulling force to structures wherein the apparatus can be moved to a position adjacent the structure and anchored in position and a flexible member is connected to the structure with the apparatus applying a pulling force to the flexible member; to provide such an apparatus for applying a pulling force having a planar base member supported on a floor surface and a standard mounted on and extending upwardly from the base member wherein the flexible member engages a guide member which is moved in response to extension of an extensible member thereby effecting a pulling force in the flexible member and proper directional application of the pulling force to the structure; to provide such an apparatus for applying a pulling force wherein the flexible member is a link chain and the apparatus has members engageable with the chain to apply a unidirectional holding force to prevent retractive movement thereof and to allow change of connection of the chain to the apparatus while applying force to the structure; to provide such an apparatus for applying a pulling force wherein the chain may be connected to selected portions of the apparatus to vary the magnitude and speed of application of the pulling force; and to provide such an apparatus for applying a pulling force which is simple to operate, durable in construction, highly maneuverable, occupies a minimum of floor space when not in use, economical to manufacture, and particularly well adapted for straightening automobile bodies, frames, panels and the like.

Other objects and advantages of this invention will become apparent from the following description taken in connection with accompanying drawings wherein are set forth by way of illustration and examples certain embodiments of this invention.

FIG. 1 is a perspective view of an apparatus for applying a pulling force to a structure and illustrating embodiments of the present invention, with the structure to receive the pulling force shown in broken lines.

FIG. 2 is a side elevational view of the pulling force applying apparatus with portions broken away to better illustrate the component parts.

FIG. 3 is an enlarged fragmentary elevational view of a guide member rotatably mounted on a movable leverage arm and a second guide member and a load holding device for preventing retractive movement of a flexible member connected to a structure to receive the pulling force and connected to a detent on the leverage arm.

FIG. 4 is an enlarged fragmentary sectional view taken on line 4—4, FIG. 3, showing the leverage arm and the guide member rotatably mounted thereon.

FIG. 5 is an enlarged fragmentary sectional view taken on line 5—5, FIG. 3, showing the second guide member and the anchor.

FIG. 6 is an enlarged fragmentary sectional view taken on line 6—6, FIG. 3, showing the load holding device.

FIG. 7 is a fragmentary side elevational view showing the flexible member connected to a detent mounted on the standard.

Referring more in detail to the drawings:

The reference numeral 1 generally designates a portable tool or mechanism for use in applying a pulling force to structures, such as for straightening damaged vehicle bodies, frames, panels, and the like. The portable tool 1 includes a planar base member 2 having a standard 3 mounted on and extending upwardly from the base member 2 with anchor means 4 connected to the standard 3 and a suitable tiedown member 5 in a support surface for holding the tool or mechanism 1 against movement toward the structure to receive the pulling force when said pulling force is effected in a flexible member 6 having one end connected or secured to a selected portion of

the structure to receive the pulling force and the other end secured to a portion of the tool or mechanism 1.

An extensible member 7 has one end thereof pivotally connected to a fixed point relative to the base member 2 and the other end thereof pivotally connected to a bellcrank or leverage arm 8 which is pivotally mounted on the standard 3 at a point spaced from the respective end of the extensible member 7. A guide member 9 is mounted on the leverage arm 8 and is engaged by the flexible member 6 in which a pulling force is effected in response to extension of the extensible member 7 and movement of the leverage arm 8.

A load holding device 10 is mounted on the standard 3 and engageable with the flexible member 6 to hold same against retractive movement upon contraction of the extensible member 7 and the load holding device 10 is operative to permit the flexible member 6 to move in one direction and limit movement thereof in the opposite direction, as later described.

In the illustrated structure, the base member 2 is an elongate planar member adapted to engage a support surface 11, such as a floor, for support thereon. The standard 3 is illustrated as being formed of a pair of laterally spaced parallel posts 12 and 13 longitudinally centered on the base member 2. Each of the posts 12 and 13 have diverging leg portions 14 and 15 extending from lower ends thereof with the lower ends of the diverging leg portions 14 and 15 being secured in spaced-apart relation to the base member 2 to form an open triangular lower portion for each of the posts 12 and 13.

A plurality of transversely aligned apertures 16 are spaced longitudinally of the posts 12 and 13 with each of the transversely aligned apertures 16 being adapted to receive a bearing shaft or pin 17 extending therethrough for rotatably mounting a guide member 18, as later described. The bearing shaft or pin 17 and the guide member 18 may be selectively positioned at suitable elevations on the posts 12 and 13 for guiding the flexible member 6 downwardly into engagement with the guide member 9 on the leverage arm 8 and particularly adapted for providing different angles or directions in the application of the pulling force to the structure.

The leverage arm 8 is illustrated as being formed of a pair of laterally spaced planar side members 19 and 20 having suitable spacer means therebetween, such as plate 21. The leverage arm 8 is positioned in the space between the posts 12 and 13 and it is desirable to mount suitable pads or shim material 22 and 23 on the exterior surfaces of the side members 19 and 20 respectively to space same inwardly from the posts 12 and 13 to thereby permit the leverage arm 8 to move freely therebetween.

The leverage arm 8 has a pair of transversely aligned apertures (not shown) in an intermediate portion thereof to receive a bearing shaft or pin 25 for pivotally mounting the leverage arm 8 between the posts 12 and 13. A lower end of the leverage arm 8 has a pair of transversely aligned apertures (not shown) to receive a suitable connecting device 27 mounted on the other end of the extensible member 7 for pivotally connecting same thereto. The other or upper end of the leverage arm 8 has a pair of transversely aligned apertures (not shown) to rotatably receive a bearing shaft or pin 29 having the guide member 9 mounted thereon.

A line extending between and normal to the axis of the shaft or pin 25 and the mounting of the connecting device 27 is substantially normal to a line extending between and normal to the axis of the shaft or pin 25 and the axis of the shaft or pin 29, and in the illustrated structure the guide member 9 is rotatably mounted on an upper portion of the leverage arm 8 and the extensible member 7 lowers the guide member 9 and a portion of the flexible member 6 in engagement therewith.

The flexible member 6 is illustrated as a chain having interconnected links with adjacent links being in normal relation, and the leverage arm 8 has holding or detent means to be engaged by the chain for holding the engaged portion against movement during extension of the extensible member 7. The holding or detent means is illustrated as a detent or dog 30

having a slot 31 in one end thereof sized to receive one link of the chain 6 and one surface of the detent or dog 30 is shaped to form shoulders to be engaged by the next adjacent link which is transverse or normal to the link within the slot 31. The surface of the detent or dog 30 adjacent the slot 31 has an end portion 32 sloping toward one end of the detent or dog 30 and another face of the detent or dog 30 is adapted to be engaged by the next link toward the free end of the chain 6 to hold same when the guide member 9 is moved downwardly by the extensible member 7.

Holding or detent means are mounted on the standard 3 to be engaged by the chain 6 for holding the engaged portion thereof against movement during extension of the extensible member 6. The holding or detent means is illustrated as a planar detent member 34 suitably secured between the posts 12 and 13 at a point above the leverage arm 8 and preferably above the diverging leg portions 14 and 15 to reinforce the standard 3 and space apart the posts 12 and 13 thereof. One end of the detent member 34 has an enlarged slot 35 sized to permit movement of the chain 6 therethrough. The other end of the detent member 34 has a narrow slot 36 therein which is similar to the slot 31 in the detent or dog 30 mounted on the leverage arm 8.

A lower surface of the detent member 34 adjacent the narrow slot 36 has an end portion 37 sloping upwardly and having notches therein positioned adjacent and extending normal or transverse to the narrow slot 36 wherein the slot 36 is adapted to receive one link of the chain 6 and the notches in the upwardly sloping surface of the end portion 37 are adapted to receive the next lower link and an upper surface 40 of the detent member 34 is adapted to be engaged by the next higher link to resist downward movement of the flexible chain 6 thereby holding an end portion of the flexible chain 6 against downward movement thereby effecting a pulling force therein when the guide member 9 is moved downwardly by extension of the extensible member 7.

Retractive movement of the chain 6 during contraction of the extensible member 7 is prevented by the load holding device 10 which comprises the detent member 34, a slidable detent or dog 41, and an upper guide plate 42 wherein the slidable detent 41 moves between the detent member 34 and the upper guide plate 42. In the illustrated structure, the detent member 34 is sloped downwardly to position the end having the enlarged slot 35 below the end having the narrow slot 36 therein whereby the slidable detent 41 is moved into engagement with the chain 6 by gravity and the slidable detent 41 is moved upwardly along the upper surface 40 of the detent member 34 in response to downward movement of the chain 6 between the guide members 9 and 18.

In the illustrated structure, the slidable detent 41 has a narrow slot 43 in a lower end thereof and the upper surface of the slidable detent 41 has an end portion 44 sloping downwardly and the end portion 44 is positioned adjacent the narrow slot 43 whereby the links of the chain 6 which are positioned transversely to the narrow slot 43 engage the surface of the end portion 44 when moving downwardly thereby urging the slidable detent 41 upwardly and out of engagement with the transverse links to permit same to move through the enlarged slot 35 of the sloping detent member 34.

Contoured notches 45 and 46 are formed at the intersection of the upper surface and the end portion 44 and the notches 45 and 46 are similar to the notches in the detent or dog 30 and are shaped to receive the links of the chain 6 which extend transversely to the narrow slot 43 whereby the downward movement of the respective transverse links urge the slidable detent 41 upwardly along the sloped detent member 34.

When the downward movement of the guide member 9 is completed, one link will be positioned within the narrow slot 43 in the slidable detent 41 and the next adjacent lower link will be transversely positioned relative to the narrow slot 43 and will engage a lower face 47 of the slidable detent 41 if the chain should be moving upwardly whereby the engagement will stop the movement of the chain 6 and prevent further retractive movement.

The upper end of the slidable detent 41 has an enlarged slot 48 to permit that portion of the chain above the sloped detent member 34 to extend through the slidable detent 41. When it is desired to permit retractive movement of the flexible chain 6 it is necessary to disengage the lower surface 47 from the respective transverse link, therefore, a handle 49 is mounted on the upper end of the slidable detent 41 whereby the handle 49 may be grasped to pull the lower end of the slidable detent 41 out of engagement with the respective link of the chain 6.

The guide members 9 and 18 are illustrated as sprockets particularly adapted to firmly engage the links of the chain 6 to substantially prevent slippage thereof during the effecting of the pulling force in the chain 6. In the illustrated structure, each of the sprockets has a pair of laterally spaced planar side members 50 and 51 each having a plurality of circumferentially spaced projections 52 extending from the periphery thereof. That portion of the periphery between adjacent projections 52 defines link supporting surfaces 53 whereby every other link engages one of the link supporting surfaces 53 with the links therebetween being positioned between the side members 50 and 51.

The projections 52 on the side members 50 and 51 are arranged in aligned pairs and a center member 54 is positioned between the side members 50 and 51 and the center member 54 has a thickness sufficient to provide clearance for the links positioned between the side members 50 and 51. The center member 54 has a recess in the peripheral edge thereof for each pair of aligned projections 52 with each recess defining a link supporting surface 56.

In the illustrated structure, the anchor means 4 is connected to the tiedown member 5 and to the standard 3 at a point alignable with the bearing shaft or pin 17 having the guide member 18 mounted thereon. The anchor means 4 is illustrated as a suitable flexible member, such as a chain having interconnected links with adjacent links being in normal relation wherein the anchor chain 4 has an upper end thereof in engagement with an anchor detent 57 which is fixedly mounted between a pair of arms 58 and 59 pivotally mounted on the bearing shaft or pin 17 having the guide member 18 mounted thereon.

A lower surface of the anchor detent 57 has an end portion 60 extending upwardly toward an upper surface 61 thereof. A slot 62 is positioned in the anchor detent 57 at the inner end thereof or the end adjacent the standard 3 to receive a link of the anchor chain 4 wherein the next upper link engages the upper surface 61.

The leverage arm 8 is moved up and down in response to operation of suitable power means in the form of the extensible member 7 which is illustrated as a hydraulic ram 63 having a cylinder 64 with a piston rod 65 extending therefrom with one end of the ram 63 pivotally connected to the connecting device 27 on the lower end of the leverage arm 8 and the other end pivotally connected between the posts 12 and 13.

In the illustrated structure, the other end of the ram 63 is mounted on a shaft 66 extending between adjacent diverging leg portions of the posts 12 and 13. It is preferred that the ram 63 have a suitable connection 67 with a pump and a valve structure (not shown) whereby the ram 63 may be extended and contracted under power as desired.

Roller or wheel means are mounted on the base member 2 and normally positioned above same for movably supporting the base member 2 and the standard 3 when the base and standard are moved or tilted to engage the roller or wheel means with the support surface 11. In the illustrated structure, a pair of laterally spaced wheels 69 and 70 are rotatably mounted on arms 71 and 72 respectively extending upwardly and outwardly from one end of the base member 2 to position the wheels 69 and 70 beyond the end of the base member 2 whereby only a slight tilting of the standard 3 is necessary to engage the wheels 69 and 70 with the support surface 11 and raise the end of the base member 2 out of engagement with the support surface 11.

In using the pulling force applying tool or mechanism 1, constructed as illustrated and described, the standard 3 is

tilted toward the wheels 69 and 70 and the tool or mechanism 1 is moved to a position adjacent a structure to receive a pulling force and preferably the tool 1 is positioned between the tiedown member 5 and the structure. A chain is positioned with a link in the slot 62 of the anchor detent 57 and the next upper link engaging the upper surface 61 thereof and the lower end of the chain is suitably secured to the tiedown 5 mounted in the support surface 11. The flexible member or chain 6 has one end suitably secured or connected to the structure to receive the pulling force, such as for straightening damaged vehicle frames, bodies, panels, and the like, as shown in broken lines FIG. 1, and the chain 6 is extended over the guide member 18 and downwardly to and under the guide member 9 on the leverage arm 8. One of the links adjacent the free end of the chain 6 is connected to the detent or clog 30 on the leverage arm 8. The ram 63 is operated to pivot the leverage arm 8 about the bearing shaft or pin 25 thereby lowering the guide member 9 to effect the pulling force in the flexible member 6 thereby applying a pulling force to the structure having the chain 6 connected thereto. During this pulling movement, the engagement of the chain with the surface of the end portion 44 of the slidable detent 41 will effect retractive movement of slidable detent 41 whereby the chain can be pulled through the enlarged slot 35 of the detent member 34. When the downward swinging stroke of the guide member 9 is completed, the application of pressure to the cylinder 64 of the ram 63 is reversed to contract same effecting upward swinging movement of the leverage arm 8. The slidable detent 41 is thereby allowed to slide down the detent member 34 as a retractive movement of the chain 6 is started and the next transverse link below the slidable detent 41 will engage the lower surface 47 thereof and prevent further retractive movement of the chain 6. After the upward movement of the leverage arm 8 has been completed, the chain is again connected to the detent member 30 for further downward pull on the chain and additional pull on the structure to receive the pulling force. This action can be repeated until sufficient movement has been imparted to the structure to receive the pulling force.

The moment arm of the ram 63 in swinging the leverage arm 8 is substantially equal to the moment arm effecting the pulling force in the chain 6 as evidenced by the spacing between the bearing shaft or pin 25 and the connecting device 27 being substantially equal to the spacing between the bearing shaft or pin 25 and the bearing shaft or pin 29 having the guide member 9 mounted thereon whereby the pulling force in the chain 6 is substantially equal to the magnitude of the force exerted by the ram 63 on the leverage arm 8 when the chain 6 is connected to the detent member 30 on the arm 8. The speed of the movement of the chain 6 between the guide member 9 and 18 and therefore the speed of the application of the pulling force in response to extension of the ram 63 is also substantially equal to the speed of the downward swinging stroke of the guide member 9 when the chain 6 is connected to the detent member 30 on the arm 8.

When it is desired to increase the speed of application of the pulling force, the chain 6 is connected to the detent member 34 at the narrow slot 36 therein. The speed of the movement of the chain 6 between the guide members 9 and 18 and therefore the speed of the application of the pulling force in response to extension of the ram 63 will then be substantially twice the speed of the downward swinging stroke of the guide member 9 and the magnitude of the pulling force will be substantially one-half of the magnitude of the force exerted by the ram 63 on the leverage arm 8 when the chain 6 is connected to the detent member 34 mounted on the standard 3. It is noted that the guide member 9 will rotate when the chain 6 is connected to the detent member 34 mounted on the standard 3 and that the guide member 9 will not have any or only a minimum of appreciable rotation when the chain 6 is connected to the detent member 30 mounted on the leverage arm 8.

The speed of application of the pulling force and magnitude of the pulling force may be changed during operation of the pulling force applying tool or mechanism by stopping and reversing the ram 63 to permit a retractive movement of the chain 6 to effect the engagement thereof with the lower surface of the slidable detent 41, as previously described, to hold the load or pulling force in the chain 6. After the upward movement of the chain 6 has stopped, the chain may be disconnected from the detent 30 and connected to the detent 34 or vice versa. This action can be repeated as often as desired and the speed of the application of the pulling force can also be changed by changing the speed of the extension of the ram 63 when the chain 6 is connected to the detent 30 or 34.

In some instances, it is desirable to have the force applied in a more upwardly direction and in such event, the guide member 18 may be rotatably mounted at the desired position by mounting the bearing shaft or pin 17 in a selected pair of the aligned apertures 16 in the posts 12 and 13. The chain 6 is connected to the portion of the structure to receive the upward pulling force and extended over the guide member 18 and then downwardly and below the guide member 9 on the leverage arm 8 and selectively connected to the detent 30 or 34. The same action of the ram 63 is applied to effect a pulling force on the chain 6. Obviously the angle of application of the pulling force can be widely varied by varying the position of the guide member 18 from a lower position on the posts 12 and 13 to the uppermost position thereon.

It is understood that while I have illustrated and described one form of my invention, it is not to be limited to the specific form or arrangement of parts herein described and shown.

What I claim and desire to secure by Letters Patent is:

1. An apparatus for applying a pulling force to structures comprising:
 - a. a base adapted to engage a surface for support thereon;
 - b. a standard mounted on said base and upstanding therefrom;
 - c. an extensible member having one end thereof pivotally connected to a fixed point relative to said base;
 - d. a flexible member adapted to be connected to a structure to receive a pulling force;
 - e. means actuated by said extensible member and having a portion engaging said flexible member to apply a pulling force thereto in response to extension of said extensible member;
 - f. means mounted on said standard above said pulling force applying means for guiding said flexible member into engagement therewith;
 - g. means mounted on said standard and engageable with said flexible member to hold same against retractive movement upon contraction of said extensible member and to permit said flexible member to move in one direction and limit movement in the opposite direction;
 - h. a fixedly mounted anchor spaced from said base; and
 - i. means adapted to be connected to said anchor and to said standard at a point alignable with said flexible member guiding means for holding said standard against movement toward the structure to receive the pulling force when said extensible member is extended to effect said pulling force.
2. The apparatus for applying a pulling force as set forth in claim 1 wherein said means for applying a pulling force to said flexible member in response to extension of said extensible member includes:
 - a. a leverage arm having an intermediate portion pivotally mounted on said standard, one end of said leverage arm having the other end of said extensible member pivotally connected thereto;
 - b. a guide member rotatably mounted on the other end of said leverage arm, said guide member being positioned below said flexible member therefrom; and
 - c. means on said leverage arm for engaging a portion of said flexible member and holding said engaged portion against

movement during extension of said extensible member, said flexible member holding means being spaced from said guide member.

3. The apparatus for applying a pulling force as set forth in claim 2 wherein:

- a. said flexible member is a chain having interconnected links with adjacent links being in normal relation;
- b. said flexible member guiding means mounted on said standard and said guide member mounted on said leverage arm are sprockets; and
- c. each of said sprockets has a pair of laterally spaced planar members each having a plurality of circumferentially spaced projections extending from the periphery thereof, said projections defining link supporting surfaces between adjacent projections.

4. The apparatus for applying a pulling force as set forth in claim 3 wherein:

- a. said projections on said spaced planar members are arranged in aligned pairs;
- b. each of said sprockets has a planar center member between said spaced planar members; and
- c. said center member has a recess in the peripheral edge thereof for each pair of aligned projections, said recesses each defining a link supporting surface.

5. The apparatus for applying a pulling force as set forth in claim 1 wherein:

- a. said base is an elongate planar member;
- b. said standard is formed of a pair of laterally spaced parallel frames;
- c. each of said frames has a side member mounted adjacent each end of said base and extending upwardly therefrom and converging at an intersection above the longitudinal center of said base; and
- d. each of said frames has a post extending upwardly from the intersection of said side members.

6. The apparatus for applying pulling force as set forth in claim 2 wherein:

- a. a line extending between the pivotal mounting of said leverage arm and the pivotal mounting of the other end of said extensible member is substantially normal to a line extending between the pivotal mounting of said leverage arm and said guide member; and
- b. said guide member is rotatably mounted on an upper portion of said leverage arm and said other end of said extensible member is pivotally connected to a lower portion of said leverage arm whereby extension of said extensible member lowers said guide member and the portion of said flexible member in engagement therewith.

7. The apparatus for applying a pulling force as set forth in claim 1 wherein said means for applying a pulling force to said flexible member in response to extension of said extensible member includes:

- a. a movable member mounted on said standard and having the extensible member connected thereto to effect movement thereof;
- b. means on said moveable member and on said standard to be selectively engaged by a portion of said flexible member for holding said engaged portion against movement during extension of said extensible member whereby each holding means for said flexible member effects a different magnitude of the pulling force for equal extension of said extensible member.

8. A portable apparatus for applying a pulling force to structures comprising:

- a. an elongate planar base member adapted to engage a surface for support thereon;
- b. a standard mounted on said base and upstanding therefrom;
- c. roller means mounted on said base and normally positioned above same for movably supporting said base and standard when said base and standard are moved to engage said roller means with the support surface;
- d. an extensible member having one end thereof pivotally

connected to a fixed point relative to said base;

- e. a flexible member adapted to be connected to a structure to receive a pulling force;
- f. means actuated by said extensible member and having a portion engaging said flexible member to apply a pulling force thereto in response to extension of said extensible member;
- g. means mounted on said standard above said pulling force applying means for guiding said flexible member into engagement therewith;
- h. means mounted on said standard and engageable with said flexible member to hold same against retractive movement upon contraction of said extensible member and to permit said flexible member to move in one direction and limit movement in the opposite direction;
- i. and anchor fixedly mounted in the support surface; and
- j. a second flexible member adapted to be connected to said anchor and to said standard at a point alignable with said guiding means for said first named flexible member to hold said standard against movement toward the structure to receive the pulling force when said extensible member is extended to effect said pulling force.

9. The apparatus for applying a pulling force as set forth in claim 8 including:

- a. means on said standard positioned between said guiding means for said first named flexible member and said pulling force applying means for engaging a portion of said first named flexible member and holding said engaged portion thereof against movement during extension of said extensible member; and
- b. means associated with said means for applying a pulling force to said first named flexible member for engaging a portion of said first named flexible member and holding said engaged portion thereof against movement during extension of said extensible member whereby each holding means for said first named flexible member effects a different magnitude of the pulling force.

10. The apparatus for applying a pulling force as set forth in claim 9 wherein:

- a. said first named flexible member is a chain having interconnected links with adjacent links thereof being in normal relation; and
- b. said means to hold said flexible member against retractive movement is a dog guidably mounted on said standard for movement into and out of engagement with the links of said chain, said dog is movable down an inclined surface to be engaged by said chain and said dog is moved upwardly along said inclined surface in response to downward movement of said chain.

11. The apparatus for applying a pulling force as set forth in claim 10 wherein:

- a. said standard is formed of a pair of laterally spaced parallel frames longitudinally centered on said base;
- b. each of said frames has a side member mounted adjacent each end of said base and extending upwardly therefrom and converging at an intersection above the longitudinal center of said base to form a triangular lower portion;
- c. each of said frames has a post extending upwardly from the intersection of said side members;
- d. said means for applying a pulling force to said first named flexible member is a leverage arm having an intermediate portion pivotally mounted between said frames, one end of said leverage arm having the other end of said extensible member pivotally connected thereto, the other end of said leverage arm having a guide member rotatably mounted thereon, said guide member being positioned below said means for guiding said first named flexible member to receive said first named flexible member therefrom, said leverage arm being between said frames; and
- e. said one end of said extensible member is positioned between said frames.

Notice of Adverse Decision in Interference

In Interference No. 98,275 involving Patent No. 3,612,482, L. Eck, PORTABLE APPARATUS FOR APPLYING A PULLING FORCE TO STRUCTURES, final judgment adverse to the patentee was rendered Mar. 28, 1974, as to claims 1, 5 and 8.

[Official Gazette July 2, 1974.]