

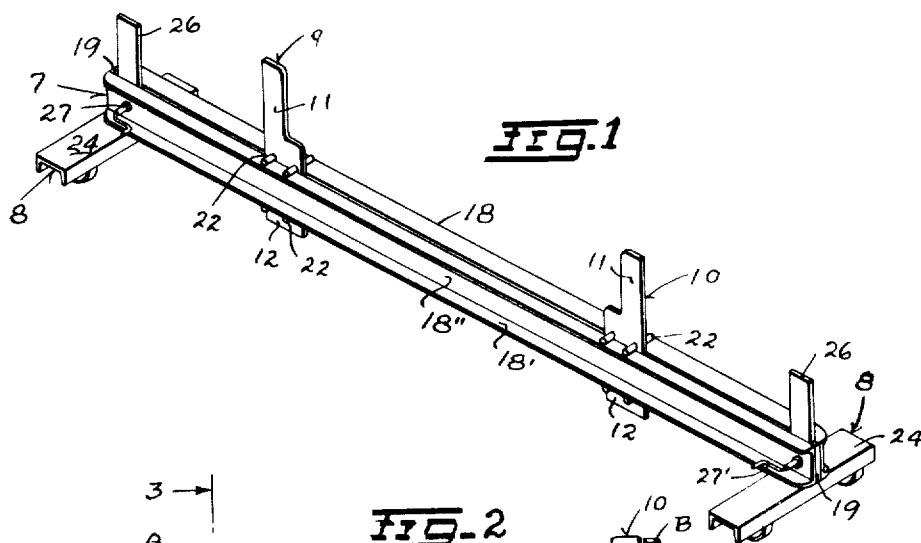
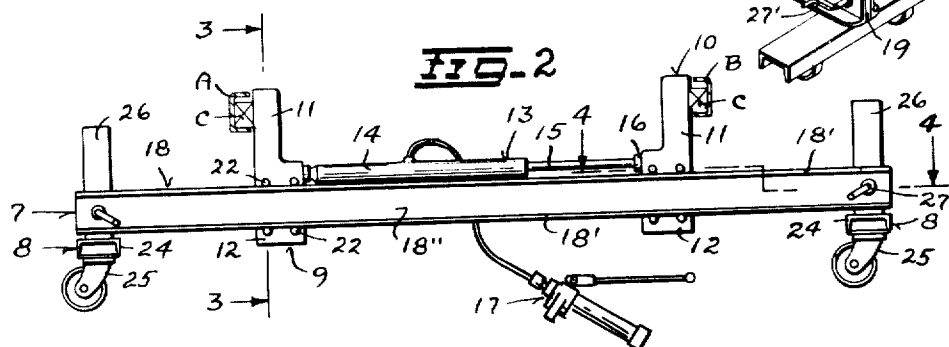
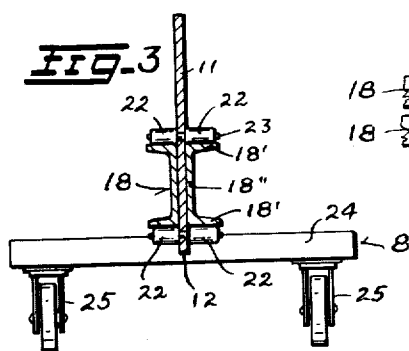
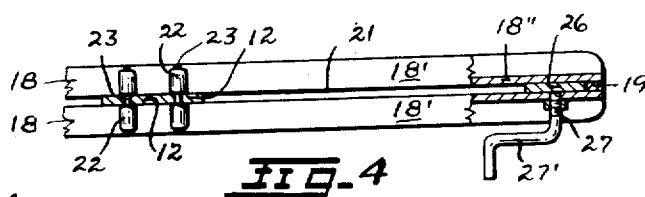
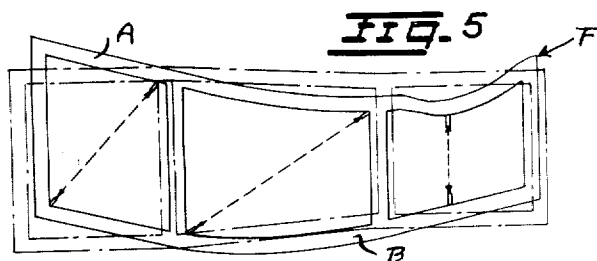
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FRAME STRAIGHTENING TOOL

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2,750,983

FRAME STRAIGHTENING TOOL

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1 Claim. (Cl. 153—48)

The invention relates to a power-operated tool for use in straightening metallic frame structures, and particularly the frames of vehicles, and comprises a continuation-in-part of my copending application, Serial Number 46,849, filed August 30, 1948, and later abandoned.

An object of the invention is to provide a tool of the character described which is applicable to a distorted frame for straightening the frame by exerting thereon restoring forces which are the effective reverse of the original distorting forces.

Another object is to provide a tool which is arranged for ready insertion in operative position from beneath the fixedly disposed frame of the chassis of a motor vehicle to dispose its working elements at suitably adjusted heights for its working application to the frame.

A further object is to provide a stretching tool of the character disclosed having its work-engaging elements freely movable with respect to each other and to the base of the tool for their operative positioning and application.

An added object is to provide a frame straightener of the character described which is of particularly simple and effective structure for its purposes.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth or be apparent in the following description thereof, and in the accompanying drawings, in which,

Figure 1 is a perspective view of a stretching tool embodying my invention.

Figure 2 is a front elevation of a tool shown as applied for mutually spreading members of a frame to be straightened.

Figure 3 is an enlarged sectional view taken at the line 3—3 in Figure 2.

Figure 4 is an enlarged and partly sectional plan view taken on the stepped line 4—4 in Figure 2.

Figure 5 is a diagrammatic plan view of a distorted vehicle-chassis frame having indicated therein certain manners of applying the present unit for a straightening of the frame to its normal symmetrical form.

As particularly shown, the features of my invention are embodied in the structure of a unitary tool which essentially comprises a beam member 7 mounted at its ends on wheeled base units 8, and adjustably carrying complementary work-engaging arm members 9 and 10 arranged for independent adjustment along the beam and each providing an upper jaw portion 11 and a lower base portion 12, and a jack for providing a spreading action by the members 9 and 10 when their jaws 11 engage the work. The present jack 13 is of a usual hydraulic type having a cylinder 14 carrying a working piston (not shown) from which a piston rod 15 extends to a working head 16. The base end of the jack cylinder 14 and the working head 16 are arranged to simultaneously engage mutually opposed edge portions of the members 9 and 10 whereby the extension of the piston rod 15 from the cylinder may urge a mutual separation of the jaws. A

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usual hand pump 17 may be provided for controlling the jack action.

The present beam member 7 comprises elements 18 of uniform like channel cross-section having their flanges 18' mutually coplanar at the top and bottom of the beam, and having their web portions 18'' in mutually spaced and parallel opposition. Blocks 19 interposed between the channel webs 18'' at the opposite beam ends space the channel elements 18 to provide a uniform guide slot 21 between the elements; the spacing members 19 may be welded in their operative position between the elements.

It will now be noted that the members 9 and 10 generally comprise elongated plate members of uniform thickness for the slidable engagement of their base portions 12 through the beam slot 21. At points thereof immediately above and below the beam 7, the members 9 and 10 mount rollers 22 which are rotatively carried on both ends of stub shafts 23 extending perpendicularly through and from base portions 12 of the members, there being a pair of the rollers 22 provided above and below the different flanges 18' of each beam element 18 in a spaced arrangement which tends to maintain the members 9 and 10 in perpendicular relation to the beam while providing a rolling support of the members on the beam. As shown, the mutually opposed edges of the arm members 9 and 10 are stepped outwardly at the bases of their portions 11 whereby the latter are somewhat narrower than the remaining portions 12 of the members for fitting in restricted places.

In the present unit, the base members 8 comprise channel-shaped elements 24 mounting a pair of floor-engaging casters 25 beneath them and having standards 26 extending upwardly from intermediate points of their tops and fixed thereto, as by welding. The standards 26 comprise plate members which slidably fit in the ends of the slot 21 and are arranged to be held in adjusted position adjacent the spacers 19, whereby the height of the beam 7 from a supporting floor may be adjusted; as particularly shown, set-screws 27 engaged threadedly through a web of the beam are operative against the standards 26 for providing the fixed adjusted support of the beam from the bases 8, and so from a supporting floor. In the present structure, the set-screws 27 are provided with attached crank handles 27' to facilitate their setting and release with respect to the standards 26.

It will now be noted that the present unit may be utilized for straightening the frame of a motor vehicle by moving it in position to dispose the upper ends of the jaws 11 adjacent and between frame points to be spread apart and in a frame-straightening operation, and thereafter operatively applying the jack 13 between the members 9 and 10 to provide the desired spreading action of the jaws against the engaged frame members. In the event that the side members A and B of a frame F (Fig. 5) to be straightened are of channel form, as is particularly shown in Figure 2, blocks C of suitable length may be interposed between jaws 11 and the webs of the frame elements A and B to provide the necessary non-twisting bearing of the jaws against said elements. It will be understood that the jack 13 may be operatively applied to and between jaw portions 11, or to and between base portions 12 (Fig. 2) as is best permitted by the structure to which the present stretching tool is applied.

Figure 5 illustrates different lines of application of the present stretching unit to a laterally distorted frame F, including the application of Figure 2, across openings of the frame, and further includes an indication of the form of the straightened frame. Understanding that the operative application of a stretching tool between spaced points of a laterally bent elongated member may straighten

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the member by the application of the requisite force in a line in or adjacent the chord line of the bend, such might be accomplished with respect to the frame of Figure 5, by, for instance, operatively applying the jaws of the present tool at points of cross members of the frame where they extend from a connecting and laterally bent side frame member, or portion thereof, for effecting the desired straightening of the latter member.

Although only a frame is shown in Figure 5, it is to be particularly noted that, by reason of the offset action of the jaws 9 and 10 with respect to the beam 7, and the adjustability of the jaws toward and from each other, the present tool may usually be operatively applied for straightening a vehicle frame while the same remains attached to the vehicle elements which it normally carries and which carry it; thus, the beam is disposable beneath all frame-carried elements which would prevent a disposal of a stretching tool in the line of the desired stretching action. Furthermore, it is to be particularly noted that the desired straightening application of the present tool to the frame of a complete chassis assembly facilitates the working application of the tool in a manner to effectively reverse the action which distorted the chassis structure in the first place, whereby to avoid other distortions during and by reason of the straightening process performed by the tool.

While the present tool is advantageously usable on the frame of a vehicle while it is floor-supported from its wheels, the full advantages of the use of the tool are realized only when the frame is directly supported from a supporting floor on blocks and/or jacks to have the running gear hang freely from the frame. The frame would preferably be supported in substantially horizontal position at such a height above the floor as facilitates ready access beneath it to provide for an operative setting of the tool from beneath the frame by a mechanic.

Having a vehicle disposed over a floor for the application of a present tool to it, one or more of the caster-mounted tools are rolled into such positions under the frame that the jaws 11 of their members 9 and 10 are disposed adjacent and between a pair of frame points to which they are to be applied. The ends of the beam 7 are then vertically adjusted along the supporting base standards 26 to dispose the working points of the jaws 11 opposite the points of the frame members to be engaged, and the members 9 and 10 are shifted by hand as necessary to engage the jaws with such points. A jack 13 is now positioned and operatively engaged solely with and between the members 9 and 10 on the beam 7 in the illustrated manner whereby its actuation will forcibly separate the members 9 and 10 against the resistance of the engaged frame members for forcing the engaged frame points apart in a frame-straightening action.

It will now be noted that the application of the force of the jack 13 against points of the members 9 and 10 which are between their jaws and the upper rollers 22 opposite the top of the beam 7 is arranged to relatively spread the bottoms of the members 9 and 10 while slightly tilting the members to cause, in effect, a one-way, or ratchet, locking of the members to the beam during and by reason of the frame resistance to a mutual separation of the engaged frame members. Accordingly, while the members 9 and 10 are forcibly separated against the frame resistance, the members are locked against return movements thereof yet may be further separated by a continued actuation of the jack. In this manner, the jack 13 may be removed without releasing the members 9 and 10, whereby to provide for its replacement by a jack having a longer working stroke or for its blocking between the members to permit its use for further spreading the members 9 and 10. When the jack is released from its operative disposal between the members 9 and 10, said members may be released from the ratchet-locking action of the rollers 22 by tapping the bottom end of either member toward the other member, it being under-

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stood that the described locking of the slightly tilted members 9 and 10 is provided by the forcible engagements of the mutually closest upper rollers 22 of the different members 9 and 10 with the beam 7 and the mutually farthest lower rollers 22 with the beam.

Recalling that the members 9 and 10 are relatively movable along the beam 7 to insure their working reactions against the engaged frame members while the free-rolling support of the beam 7 on the casters 25 also permits the required operative engagement of the members 9 and 10 with the opposed frame points, it will be understood that the straightening of a distorted frame may effect a lowering of one or both of the engaged frame points with respect to the underlying floor to act through the secured base units 8 to produce an undesirable thrust against the floor and so prevent the desired free action of the tool. Accordingly, it is customary to release the set-screws 27 from their operative engagement with the standards 26, after the beam is frame-supported, whereby the beam 7, and the members 9 and 10 and the jack 13 carried by it, have the required "floating" support entirely from and beneath the frame during a spreading action of the engaged frame members by the jaws 11 of the members 9 and 10. Such a pre-floating support of the operative tool by the engaged frame is understood to permit the restoration of a distorted frame to its normal form by a reverse application of the distorting force resulting from a collision or other cause without introducing other distortions of the frame during the straightening process.

In straightening bent frame members, and particularly frame members in which wrinkles have been produced on the inner sides of their bends, it is customary to appropriately heat a member being straightened along solely the inner bend side for softening it thereat for its stretching back to its original form. Also, while the present disclosure of the application of my straightening tool is to channel members, it will be obvious that the present tool is usable for the straightening of members of other forms including box and I sections. It will be understood that several of the present frame straightening units may be used simultaneously with a given frame and with the various units applied in various working directions with respect to the frame. Furthermore, since neither the frame or units need be anchored to and with respect to a supporting surface, the units may be readily applied for their purpose away from a shop and without requiring the provision of special ancillary equipment.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the present frame straightening tool may be readily understood by those skilled in the art to which the invention appertains. While I have described a form of my invention which I now consider to comprise a preferred embodiment thereof, I desire to have it understood that the showings are primarily illustrative, and that such changes and developments may be made, when desired, as fall within the scope of the following claim.

I claim:

In apparatus for straightening the underframe of a floor-supported vehicle, a beam disposed beneath the underframe, complementary frame-engaging arms extending similarly and upwardly from said beam in a common plane with the lower arm portions having sliding and retaining connections with the beam for guided movements therealong while maintaining their angular relations to the beam and with the upper arm portions comprising jaws arranged to engage spaced points of the overlying underframe, complementary frame-engaging arms expoints while attaching the beam to the frame, a jack for direct engagement solely with and between intermediate arm points for operatively spreading the frame points engaged by the arms, caster-carried support members independently and releasably carrying the opposite beam ends spaced from the vehicle-supporting floor in adjusted height relation thereto for the operative disposition

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of the frame points to be engaged and their subsequent release when the beam is attached to the frame, and means cooperative between the beam and support members for retaining the members in fixed underlying relation to the beam while the beam is attached to the vehicle frame and the members are released from their supporting relation to the beam.

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