Dec. 14, 1971 R. J. ROUIS 3,626,747

ATTACHMENTS FOR FRAME STRAIGHTENING MACHINE

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FIG. 1

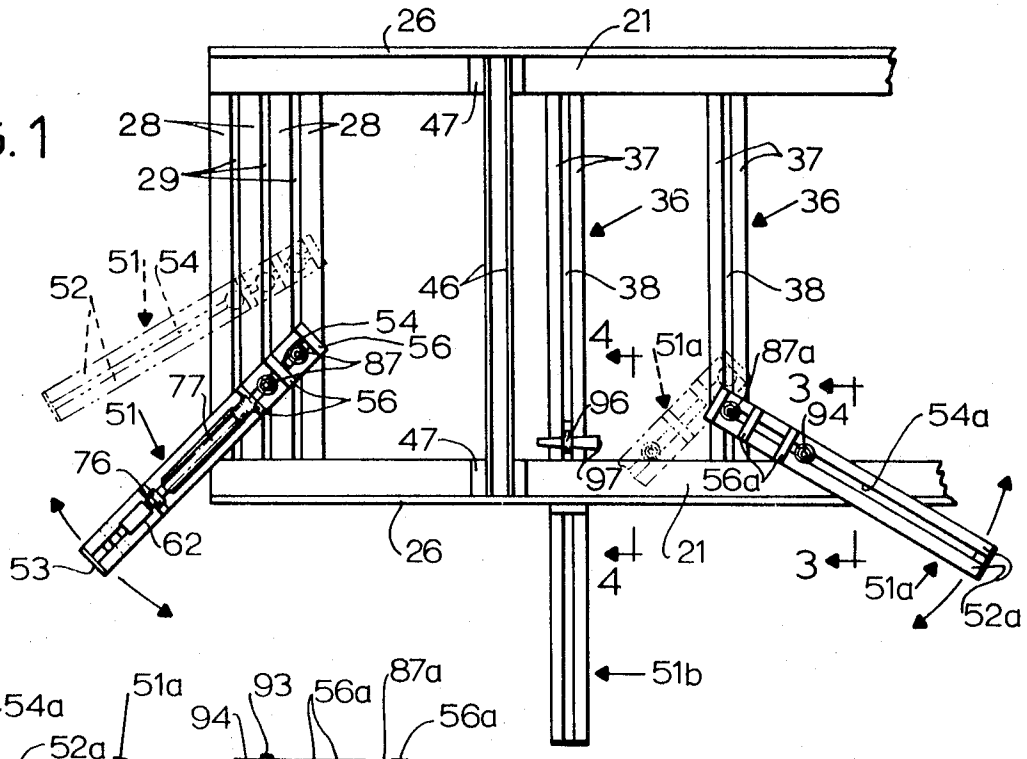



FIG. 3

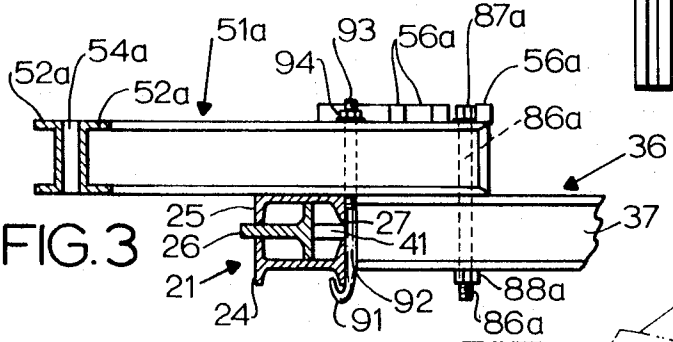



FIG. 2

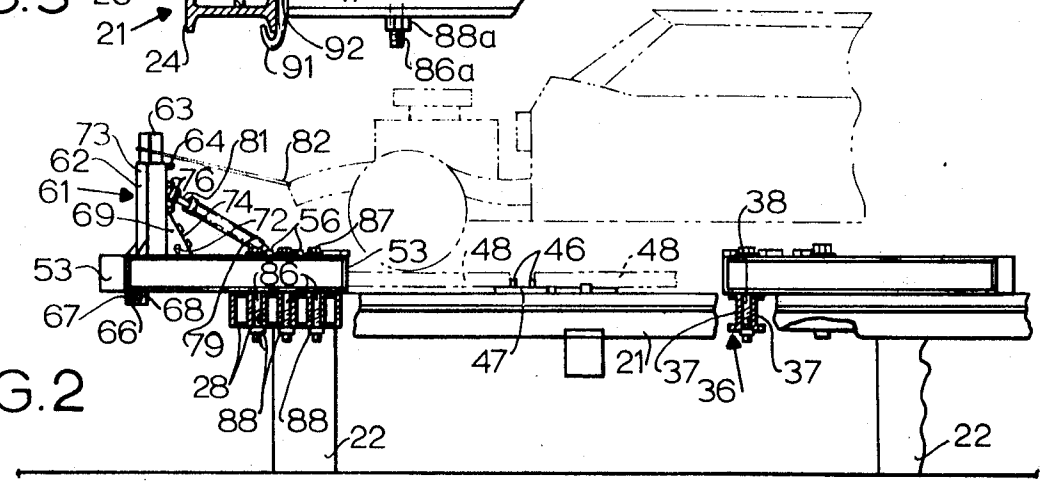
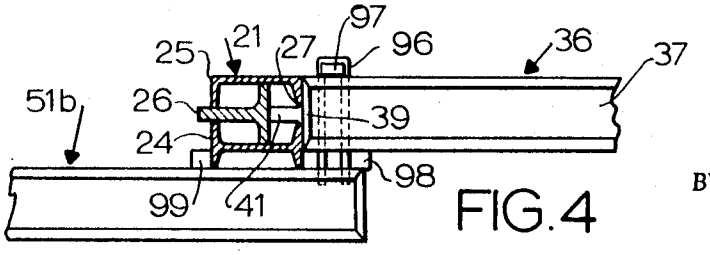



FIG. 4




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# ATTACHMENTS FOR FRAME STRAIGHTENING MACHINE

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Int. Cl. B21j 9/18

U.S. Cl. 72—453 8 Claims

## ABSTRACT OF THE DISCLOSURE

A vehicle frame straightening machine has a flat, rigid base formed of longitudinal side rails and transverse front and rear ends, the latter formed with parallel vertical slots. The side rails are formed with inward facing horizontal slots which receive the ends of transverse vertically slotted horizontal rails fitting between the side rails and longitudinally movable with respect thereto. The attachment is formed with a vertical longitudinal slot. It may be attached to either the front or rear end by resting same upon the end and inserting bolts through the slot in the attachment and through different slots in the end. By sliding the bolts laterally of the base the lateral position of the attachment is adjusted and by swinging the attachment in an arc, permitting the bolts to slide in the slots and then tightening nuts on the ends thereof the attachment is fixed in diagonal position. Similarly, a bolt may be inserted through the attachment slot in the transverse rail slot and also a hook through the attachment slot to engage the side rail to locate the attachment at a diagonal. Means is provided to apply diagonal pulls to a vehicle frame on the base. Also an underslung attachment may be supported below the base.

This application is a continuation-in-part of copending application Ser. No. 613,274, filed Feb. 1, 1967, now Patent 3,518,867.

This invention relates to new and improved attachments for vehicle frame straightening machines. One of the principal features of the present invention is that an attachment is provided which enables the operator to apply a pulling or pushing force to the vehicle frame at a diagonal relative to the frame. Prior frame straightening machines have been capable of applying longitudinal or transverse forces or a combination of such forces. However, in many situations it is necessary in order to properly straighten a frame to apply a force at a diagonal relative to the frame and the present invention provides a convenient means for applying such force.

Another feature of the invention is the fact that the angle along which the diagonal force is applied may be adjusted to suit the conditions of the particular job being performed. Thus the attachment is fastened to the base of the machine by means which may be loosened to permit the attachment to swing through an arc and thereafter the fastening means is tightened, securing the attachment in a selected position relative to the longitudinal and transverse base elements.

Still another feature of the invention is the fact that the diagonal attachment may be moved relative to the base transversely and longitudinally so that the force is applied in proper position relative to the vehicle frame being straightened.

Thus the principal feature of the present invention is the fact that it promotes wide versatility in the position and direction of application of pulling and pushing forces to straightening machines.



In another version of the invention the attachment along which the force is applied is fastened under the base rather than on top of it. This underslinging of the attachment makes it possible to apply forces close to the surface of the base when such positioning is desirable. The underslung attachment also makes possible access to the vehicle frame by the operator under conditions which would not ordinarily be feasible where the attachment is located on top of the base.

Various fittings may be used in conjunction with and slidable along the length of the attachments. Such fittings are adjustable for pulling and pushing forces either horizontally or at angles with respect to the horizontal.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a plan view of a portion of a frame straightening device showing attachments in one position of variable positions in solid lines and showing other positions in dot and dash lines.

FIG. 2 is a side-elevational view of the structure of FIG. 1 partly broken away in section to reveal interior construction.

FIG. 3 is a fragmentary sectional view taken substantially along the line 3—3 of FIG. 1.

FIG. 4 is a fragmentary sectional view taken substantially along the line 4—4 of FIG. 1.

The machine frame or base is shown only partially in the accompanying drawings and is shown in greater detail in application Ser. No. 613,274. Such base comprises a massive, rigid structure of a length and width substantially greater than that of the vehicles with which the machine is used. On either side is a longitudinal horizontal side rail **21** supported above the ground at various locations by legs **22**. As best shown in FIG. 3, side rail **21** may be fabricated by welding together an I-beam **24**, an inverted channel **25** and a T-shaped beam **26** positioned with the end of the leg of the T extending outwardly of the rail **21** with an inward facing horizontal slot **27** opposite the leg of T **26**. It will be understood that the members used to fabricate rail **21** are subject to considerable variation but it is important for understanding the present invention to appreciate that there is an inward facing horizontal slot **27** on the inner side of the rail **21** and it is desirable that there be a projection **26** of the T-shaped beam on the surface opposite slot **27**. At the front end of the machine are four horizontal transverse members **28**, each preferably formed of rectangular mechanical tubing and spaced apart longitudinally of the machine to provide three transverse vertical slots **29**. Although not shown in the accompanying drawings, there are similar members **28** and slots **29** at the rear of the machine. The ends of members **28** are welded to rails **21**. Preferably the top surfaces of rails **21** and members **28** are co-planar and horizontal and thus comprise a reference table where the work can be performed on the vehicle.

A plurality of transverse rails **36** is provided, said rails being longitudinally slideable relative to the base. Construction of rails **36** is likewise subject to some variation, but as shown in the accompanying drawings, said rails are formed of a pair of oppositely outwardly facing horizontal transverse channels **37**, the ends of which are welded to vertical plate **39**, spaced apart to provide transverse vertical slots **38** and from which extend horizontal transverse tongues **41** fitting into slots **27**. Tongues **41** slide in slots **26** to provide for longitudinal movement of rails **36**. Rails **36** may assume slight angles relative to side

rails 21 when required by reason of the nature of the work being performed.

As best shown in FIG. 2, at several locations spaced longitudinally are pairs of horizontal transverse tread support bars 46 which are elevated above rails 21 by pads 47 welded thereto. On either side of the machine are tread sections 48 which have horizontal top surfaces upon which the wheels of the vehicle being straightened rest. The various tread sections 48 are adjustable in width and are also removable to provide access to the underside of the vehicle being handled. Various means may be used to hold the vehicle and its wheels to restrain movement either longitudinally, transversely or vertically.

Diagonal pull attachments 51*a* may be used in conjunction with end members 28 or any of the transverse rails 36 in various locations and at various angles as hereinafter explained. Each of the said attachments 51, 51*a* comprises a pair of outwardly facing channels 52 welded at opposite ends to a vertical plate 53 with their webs spaced apart to provide a vertical space 54 which extends longitudinally of the attachment. At spaced intervals extending transversely along one end of attachment 51 are abutments 56 for a purpose which hereinafter appears. As best shown in FIGS. 1 and 2, a sliding member or fitting 61 is shown in conjunction with attachment 51. Member 61 has a vertical, rectangular socket-forming portion 62 which receives a vertically sliding bar 63 which is held in various positions of vertical adjustment by set screws 64. Extending below portion 62 and through slot 54 is leg 66 which is fitted with a roller bearing 67 and rotatably secures a shaft 68. Shaft 68 fits under the bottom of channels 52. On the opposite side of socket-forming member 62 and above member 51 is a top leg 69 which also is provided with a top stub shaft 72 fitting on top of channels 52. The readily rotatable shafts 68 and 72 riding on the bottom and top of member 61, respectively, facilitate sliding movement of member 61 lengthwise of attachment 51. The upper end 73 of socket-forming portions 62 is substantially vertical and there below is a slanted surface 74 of leg 69. At intervals on edges 73, 74 are abutments 76. Hydraulic extensible cylinders 77 are provided with ends 79 which fit against one of the abutments 56. The rod end 81 fits against one of the abutments 76. When hydraulic pressure is applied in cylinder 77, the rod end 81 moves outward, pushing the sliding member 61 to the left as viewed in FIG. 2. A hook 82 at one end fits around bar 73 and at its other end is hooked to a portion of the frame of the vehicle. As the rod end 81 projects, a pull is exerted on the frame member tending to straighten the same. It is noted that bar 63 is vertically adjustable and also that hook 82 may be fastened thereto at various elevations so that an upward, a directly horizontal, or a downward pull may be exerted on the frame depending upon the straightening operation required. It will be understood that members similar to members 61 but differing in details of construction may be substituted therefor. Some of such variations in construction are shown in Application Ser. No. 613,274.

The improvement which is the subject of the present invention relates to the orientation of the attachment 51, 51*a* so as to apply to the frame being straightened a diagonal pull in the sense of the angles which members 51, 51*a* assume relative to rail 21 and end pieces 28. Directing attention to the left hand end of FIG. 1 and FIG. 2, bolts 86 having enlarged heads 87 are inserted through slot 54 in member 51 and then through the slots 29 between the base members 28. Before the nuts 88 on the lower ends of bolts 86 are tightened, the bolts 86 may slide longitudinally of the slots 54 and 29. This capability of sliding makes it possible to adjust the position of attachment 51 in two respects. The entire attachment may be slid inward and outward toward the center line of the machine as is seen by contrasting the solid line position of attachment 51 in FIG. 1 with the dot and dash line position. Additionally, the spacing between the bolts 86 is not necessarily constant and hence by using one of the bolts 86 as a pivot and turning member 51 in an arc as indicated by the arrows in FIG. 1, the angle which attachment 51 assumes with respect to rail 21 may be adjusted. Once the desired adjustment is obtained, the nuts 88 are tightened securing the attachment 51 in position. Such adjustment of attachment 51 permits the member 61 to move in a direct line with the diagonal pull which is necessary in order to straighten the frame.

Attachment 51*a* is similar in all respects to attachment 51. Similar reference numerals followed by the subscript *a* are used to designate corresponding parts. The means for securing the attachment 51*a* in position differs from that of attachment 51 in certain respects. Bolt 86*a* is passed through slot 54*a* and then through slot 38 in transverse rail 37 and nut 88*a* applied below rail 36. Hook bight 91 engages under one of the sides of the channel member 24 making up part of the side rail 21. The shank 92 of the hook is elongated and has a threaded upper end 93 which extends up through slot 54*a* and receives nut 94. The rail 36 is movable longitudinally of the base. Bolt 86*a* is movable along the length of slot 38 thus permitting the member 51*a* to be moved from the solid line position shown in FIG. 1 inwardly to the dot and dash line position. Further, the attachment 51*a* may be swung about bolt 86*a* as a pivot to assume various angles with respect to rail 36 as is indicated by the arrows at the right-hand end of FIG. 1. Once the desired position of adjustment is reached, nuts 88*a* and 94 are tightened thereby securing the attachment 51*a* in position. Although not illustrated in the accompanying drawings it will be readily understood that a member similar to member 61 may be installed in attachment 51*a* and a diagonal pull on the side of the frame of the vehicle may be applied similarly to the pull on the front end of the frame which is accomplished by means of attachment 51 and member 61.

Directing attention now to FIG. 4, although in the preceding modifications and in the form of the invention shown in Ser. No. 613,274, the various attachments 51, 51*a* have been installed on top of the base, in some jobs it may be necessary to lower the point of application of force. Accordingly an attachment 51*b* which is similar in construction to attachment 51, is employed. Welded to the top thereof is an inverted U-shaped strap 96, which has a width which will fit up through slot 38 in rail 36 and project up above the top thereof. A wedge 97 is driven through the opening in strap 96 which projects above the top of rail 36. A block 98 is welded to the top of attachment 51*b* and fits against the bottom of rail 36, the height of block 98 being sufficient to occupy the space between the bottom of rail 36 and the bottom of rail 21. On the outside of rail 21 is a second block 99 which is welded to the upper surface of attachment 51*b* and restrains movement of attachment 51*b* to the right as viewed in FIG. 4. Members similar to members 61 may be used in conjunction with attachment 51*b* as will readily occur to one skilled in this art.

The attachments 51*a* and 51*b* are generally similar to attachment 51 and the same reference numerals, followed by subscripts *a* and *b*, respectively, are used to designate corresponding parts.

What is claimed is:

1. In a vehicle frame straightening machine, a horizontally disposed, rigid base formed with a plurality of vertically disposed first slots formed in said base, support means on said base for supporting the wheels of a vehicle, an attachment formed with a second slot of extended length formed in said attachment, at least one fitting having means extending into said second slot and guiding said fitting for movement longitudinally of said second slot, fluid actuated expansion means engaging said fitting and said attachment for moving said fitting,

and a plurality of fastening means for fastening said attachment against turning movement at an acute angle relative to said first slots, at least one of said fastening means extending through said second slot and one of said first slots.

2. A machine according to claim 1 in which said attachment is pivotable about one of said fastening means to adjust the angle of said second slot relative to said first slots.

3. A machine according to claim 1 in which said fastening means includes at least one bolt passing through said second slot and one of said first slots.

4. A machine according to claim 1 in which said fastening means comprises a plurality of bolts each passing through said second slot and a different one of said first slots.

5. A machine according to claim 1 in which said fastening means includes at least one bolt passing through said second slot and one of said first slots and a hook having a shank passing through said second slot and having a bight hooked under a portion of said base.

6. A machine according to claim 1 in which said first slots are formed by a plurality of transverse members extending across an end of said base.

7. A machine according to claim 1 in which said base has side rails formed with inward facing horizontal third slots and transverse horizontal rails movable along said frame fitting between said side rails and fitting into said third slots, said first slot formed in said transverse rail.

8. In a vehicle frame straightening machine, a horizontally disposed, rigid base formed with a plurality of vertically disposed first slots formed in said base, support



means on said base for supporting the wheels of a vehicle, an attachment formed with a second slot of extended length formed in said attachment, at least one fitting having means extending into said second slot and guiding said fitting for movement longitudinally of said second slot, fluid actuated expansion means engaging said fitting and said attachment for moving said fitting and a plurality of fastening means for fastening said attachment to said base, said fastening means comprising a U-shaped strap on top of said attachment fitting from the top of said attachment up through said first slot and extending above said base and a wedge on top of said base and projecting through the portion of said strap above said base, said attachment entirely below said base.

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U.S. Cl. X. R.

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