April 8, 1924. 1,489,424

A. J. CANFIELD ET AL

FORGED TRUCK SIDE FRAME AND PROCESS OF MAKING SAME

Filed July 1, 1921

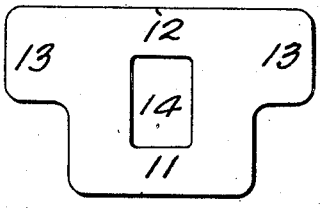


FIG. 1

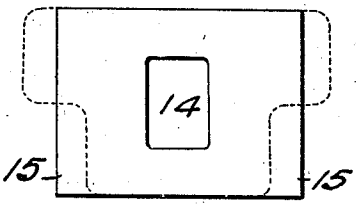


FIG. 2

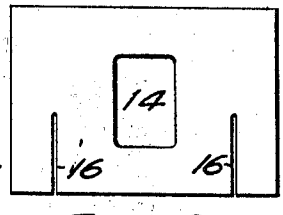


FIG. 3

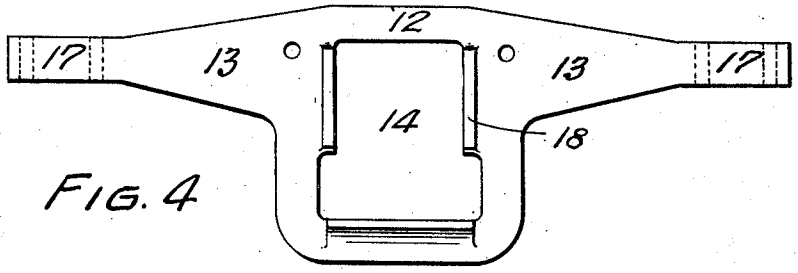


FIG. 4

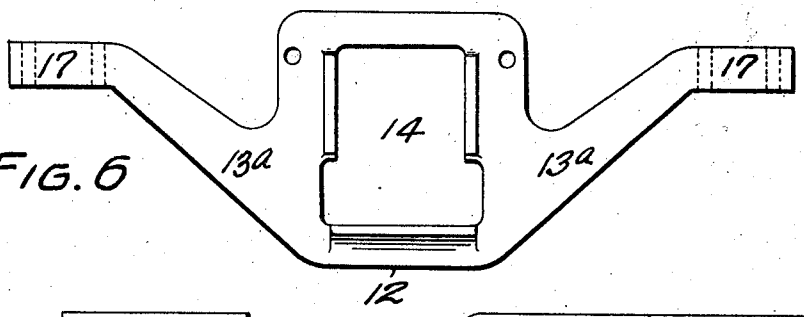


FIG. 6

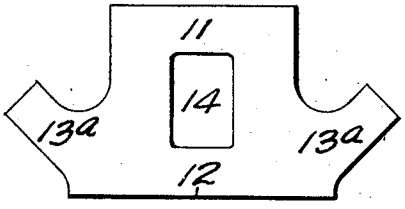


FIG. 5

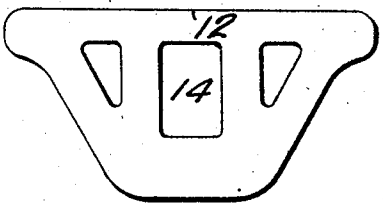


FIG. 7

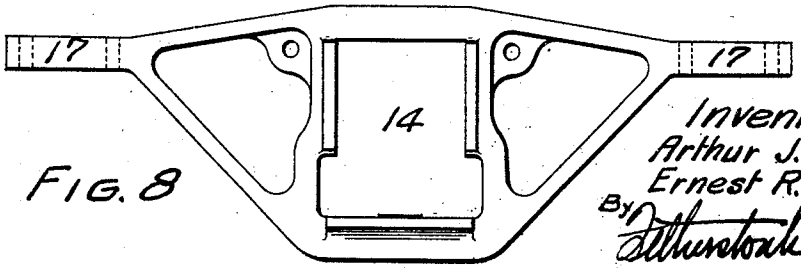


FIG. 8

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UNITED STATES PATENT OFFICE.

ARTHUR J. CANFIELD AND ERNEST R. VIBERG, OF MONTREAL, QUEBEC, CANADA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE FORGED STEEL YOKE CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF VIRGINIA.

FORGED TRUCK SIDE FRAME AND PROCESS OF MAKING SAME.

Application filed July 1, 1921. Serial No. 481,841.

To all whom it may concern:

Be it known that we, ARTHUR J. CANFIELD, a citizen of the United States, and ERNEST R. VIBERG, a subject of the King of Great Britain, and both residents of the city of Montreal, Province of Quebec, Canada, have invented certain new and useful Improvements in Forged Truck Side Frames and Processes of Making Same, and do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to forged truck side frames and method of making same, and the object of the invention is to provide for the formation of a truck side frame forged from a single piece without seams or welds.

It has already been proposed to make truck side frames by forging a single piece of metal to the desired shape but so far as can be ascertained all such frames have one or more joints either welded or riveted. The proposed frames also involve the use of material of special shape as a starting point and, according to the proposed practice, a considerable amount of metal is wasted by cutting away portions of the material to produce the desired shaping of the blank.

According to the present invention, a truck side frame is forged from a single piece of metal without seams, joints or welds of any description and without cutting away any appreciable amount of metal, so that for a side frame of any given weight a blank of substantially the same weight is taken. The operation commences with a billet or slab of suitable shape, which is pierced to form a roughly rectangular ring. The blank thus formed is forged in a series of operations to suitable shape, certain of these operations being devoted to enlarging the original opening if necessary and certain others devoted to drawing out to proper length and shape a pair of integral arms.

In the drawings which illustrate the invention;—

Fig. 1 is a plan view of a blank from which the frame is to be forged.

Fig. 2 is a plan view of a slab after the first operation of piercing.

Fig. 3 is a plan view of the slab after cutting to provide for lateral extensions.

Fig. 4 is a plan view of the complete forging of one form of frame.

Fig. 5 is a plan view corresponding to Figure 1 and illustrating the formation of a different form of the type of frame shown in Figure 4.

Fig. 6 is a view similar to Figure 4 showing a side frame completed from the blank illustrated in Figure 5.

Fig. 7 is a view similar to Figure 1 illustrating a different form of frame at the same stage of construction.

Fig. 8 is a plan view of a completed frame of the form shown in Figure 7.

Referring more particularly to the drawings, 11 designates a blank, from which it is intended to forge one form of side frame. The blank is provided at one long edge 12, which is designed to become the top of the frame with lateral extensions 13 and the central part of the blank is provided with an opening 14. The blank may be produced in a variety of ways and it will be understood that the invention is not limited to any of the various means of producing the blank hereafter explained as these methods are given to indicate that the formation of the blank is not limited to any one peculiar process. A suitably sized billet of metal of any suitable cross section may be placed in a mould or die and squeezed down to substantially fill the mould and produce a blank of the peripheral form shown in Figure 1. The opening 14 may be formed during or subsequently to the squeezing down operation. The blank may also be produced by starting with a substantially rectangular slab, as indicated in Figure 2, and forging corners 15 of the slab to shift the metal of these corners, indicated by the dotted lines, to the opposite corners of the slab, in order to produce the arms 13 of the blank shown in Figure 1. The opening 14 may be formed previously to, during or after the forging of the lateral extensions 13. The blank may be produced in still another way by starting with a substantially rectangular slab, as shown in Figure 2 and cutting in from one of the long edges of the

slab, as at 16, Figure 3, and then bending the arms thus formed into alignment with one another to produce substantially the peripheral form shown in Figure 1. The opening 14 may be formed either before or after the cutting and bending. Various combinations of these or other methods may be resorted to. For example, after the cuts 16 are made, the arms instead of being bent outwardly may be driven back into the metal beyond the cuts, thus causing the metal to expand laterally in the same manner as indicated in Figure 2.

The opening 14 in the blank is preferably formed by a piercing operation as distinguished from a punching operation, that is to say, a suitable instrument is driven into the metal and displaces the metal by driving it in all or substantially all directions away from the centre of the instrument, so that no metal is detached as occurs in a punching operation where a slug of metal is separated from the main body and becomes waste material. Another clear point of difference between the piercing and punching operations is that in the piercing operation the displacement of metal in forming the opening results in an increase in one or more of the external dimensions of the body of metal, whereas in the punching operation the external dimensions of the body are not affected. In this way, a much smaller body of metal is required to provide the desired size of blank when piercing is resorted to as compared with punching. It will be understood, however, that while piercing is preferred, the invention is not limited to this method of initially forming the opening 14 but that this opening may be punched out if desired either to a preliminary shape and size or to the finished shape and size.

It will also be understood that the opening 14 may be formed in as many operations as are found necessary or desirable and may be formed in the blank to a preliminary shape and size, as illustrated in Figure 1, or to the finished shape and size illustrated in Figures 4, 6 and 8.

The blank shown in Figure 1 is now formed by any suitable number of forging operations to the finished shape shown in Figure 4. Preferably the blank is considerably smaller than the finished frame, as will be observed by comparison of Figures 1 and 4 and the forging operations include an enlargement of the opening 14 by further piercing operations, which drive the metal in all or substantially all directions away from the centre of the opening and result in an increase in the external dimensions of the blank. This may be conveniently described as a stretching or expanding of the blank. In any suitable time relation to the formation of the finished central opening, the peripheral form of the blank is brought by any suitable number of forging operations to the finished shape. That is to say, these exterior forging operations may take place simultaneously with or after the operations of forming the finished central opening or may be alternated with the operations of forming the central opening. It will be observed that in the final forming of the frame, the lateral extensions 13 of the blank are drawn out to provide arms of any suitable shape having aligned portions 17 to form supports for journal boxes. It will be understood that no definite procedure can be laid down as to the number and order of the various forging steps, since in practice this will depend to a large extent upon the equipment available in any particular plant and upon the form in which the raw material is most readily and cheaply obtainable. For example, in a plant having large forging presses, the desired results may be obtained in a comparatively few operations by squeezing the blank in suitable dies, whereas in other shops with different equipment many of the operations may be performed with drop or power hammers.

There is illustrated in Figures 5 and 6 a slightly different form of the same type of frame as is illustrated in the preceding figures. The initial step of making this form of frame is illustrated in Figure 5 and it will be noted that it differs from the preceding form in that the extensions 13a are in angular relation to one another instead of being in alignment. This formation may be produced by forging a blank, as shown in Figure 1, or by partially turning out the arms of a cut slab as shown in Figure 3. The rough forging of Figure 5 is brought by any suitable number of forging operations to the form shown in Figure 6, these operations being for all intents and purposes the same as those already described and produce arms which slope upwardly from the bottom of the frame and terminate in aligned extensions 17, as in the previously described form. The difference between the two forms will be readily appreciated by comparison of Figures 4 and 6. In Figure 4, the arms form a simple beam or lever which is largely in compression, while in Figure 6 the arms are largely in tension.

Both forms of frame of this type differ from the ordinary truck frame in that there is only a single member extending from the central part to the journal box seats, instead of the usual truss construction including compression and tension members.

A frame of the ordinary or truss form may be constructed in accordance with this invention by following substantially the procedure already described. In Figure 7,

a blank is illustrated which may be formed with the three apertures shown in substantially the same way as the blank shown in Figure 1 or the blank in Figure 7 may be formed from a blank as shown in Figure 1 by subjecting the blank to additional piercing operations. This blank is formed by any suitable number of forging operations to the finished shape indicated in Figure 8.

With regard to the opening 14, it may be stated that when this is pierced, the opening will not initially extend entirely through the blank, as will be readily understood by persons skilled in this art. A thin skin of metal will be left either at one surface of the blank or intermediate the surfaces if the piercing is performed by two tools entering simultaneously on opposite surfaces of the material. This small amount of metal, termed a "flash," may be cut away at any suitable stage of the manufacture by punching out or by cutting with an electric arc or oxy-acetylene flame. The opening itself may be initially formed by either of these latter means or a rough opening may be thus trimmed to shape at the same time that the flash is removed. When the forging is complete, the whole frame may be heat treated if necessary to toughen the material and remove internal stresses and may be then machined to form the various bearing surfaces and drilled to receive connecting members to attach journal boxes and other parts of a complete truck. Such machining and drilling is regarded as outside of the present invention and relating to truck construction.

From the foregoing description, it will be noted that only a very small amount of metal need be removed in the process of making the frame, so that waste is reduced to a minimum. It will also be noted that the finished frame is formed without seams or welds of any description, being forged in a single piece by expanding and forging a single body of metal to the desired shape.

In the final forming of the opening 14, no matter what type or form of frame is being made, the upper part of the opening is left narrower than the lower part, providing projections 18 which may be machined to form the usual bolster guides.

From the foregoing description, it will be readily seen that while the completed frames illustrated are radically different in appearance, they are nevertheless all produced by exactly similar methods, that is to say, by the piercing of a billet, slab or blank and the gradual enlargement of the central opening, which results literally in expanding the metal, so that its outside dimensions increase with the size of the central openings. In each form and type, lateral extensions are provided on the blank and are formed into arms by suitably forging to final shape.

In the following claims, the term "billet" is to be considered as including the slab shown in Figures 2 and 3, as this is in reality only a specially formed billet.

Having thus described our invention, what we claim is;-

1. A process of making truck side frames, which comprises piercing a billet and expanding the same to substantially the dimensions of the central part of the frame and forming integral lateral extensions on the central part.

2. A process of making truck side frames, which comprises forming the central part of the frame by piercing a billet and expanding the pierced billet to substantially finished size and shape of the frame central part, and forming lateral extensions by displacing metal from the central part.

3. A process of making truck side frames which comprises flattening a billet, piercing and forming lateral extensions on the flattened billet, and forming a finished frame by a series of expanding and forging operations.

4. A process of making truck side frames, which comprises piercing and expanding and forming arms on a billet, and positioning and shaping said arms by a series of forging operations.

5. A process of making truck side frames, which comprises initially piercing and expanding a billet, forming arms integral with the billet, and positioning and shaping said arms to form journal box supports and further expanding the central portion of the billet to form a bolster guide.

In witness whereof, we have hereunto set our hands.

ARTHUR J. CANFIELD.
ERNEST R. VIBERG.