(No Model.)

# E. F. GOLTRA & M. B. SCHAFFER.

## CAR TRUCK BOLSTER.

No. 504,267. Patented Aug. 29, 1893.

Fig. 4.

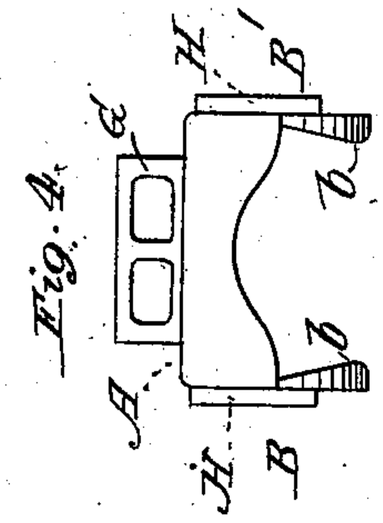



Fig. 5.

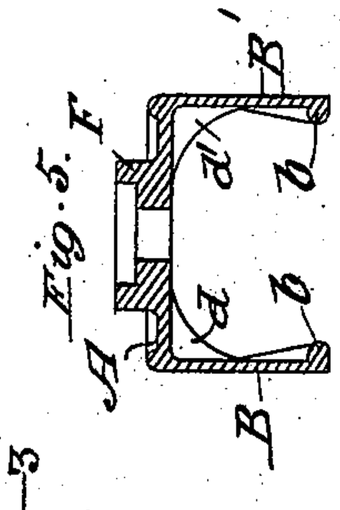



Fig. 8.

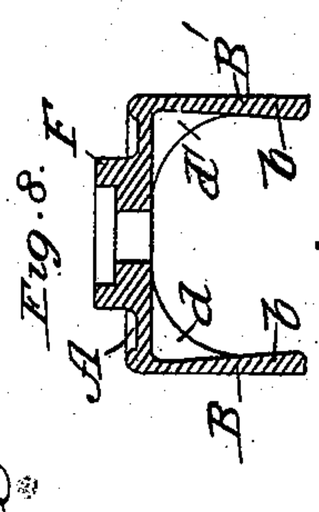



Fig. 7.

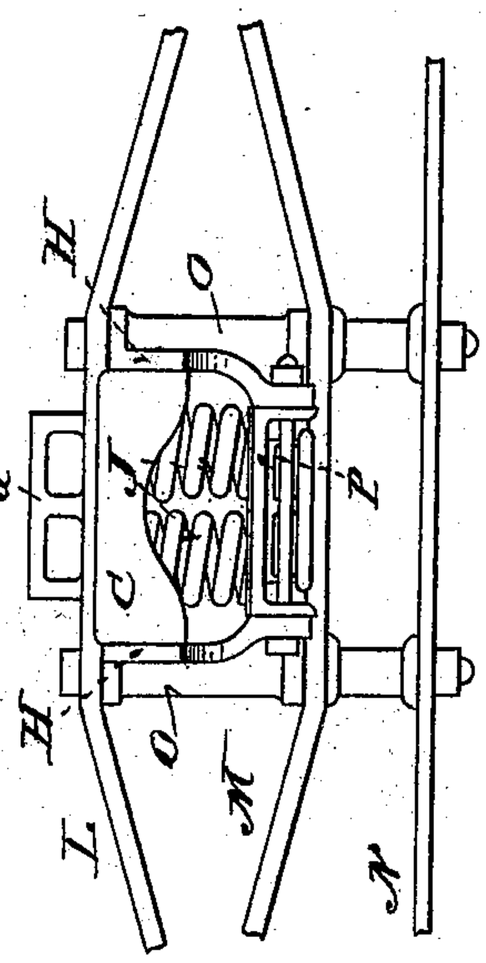



Fig. 1.

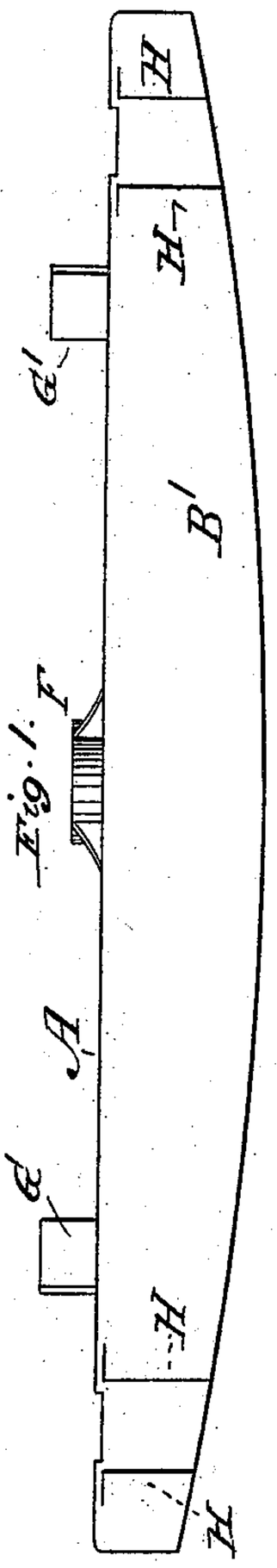



Fig. 2.

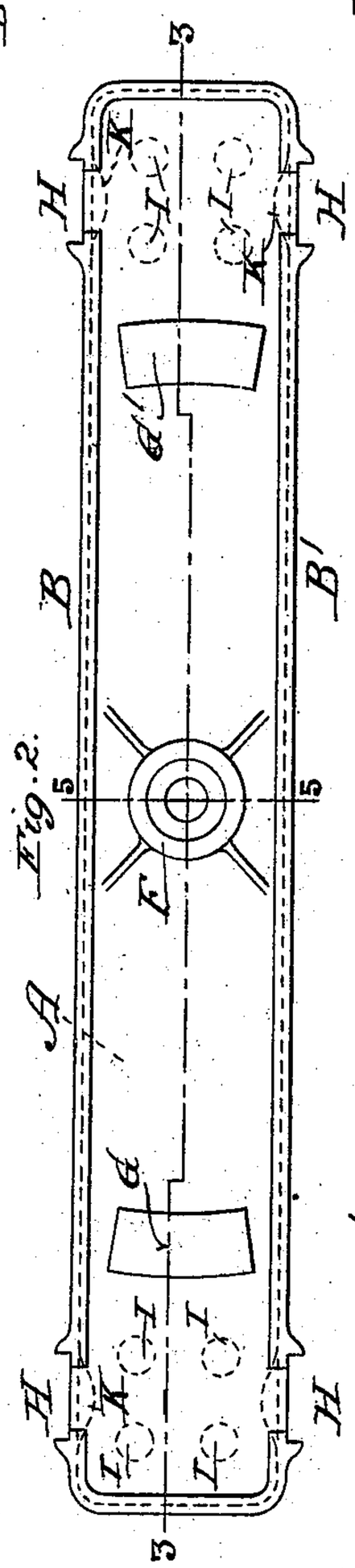



Fig. 3.

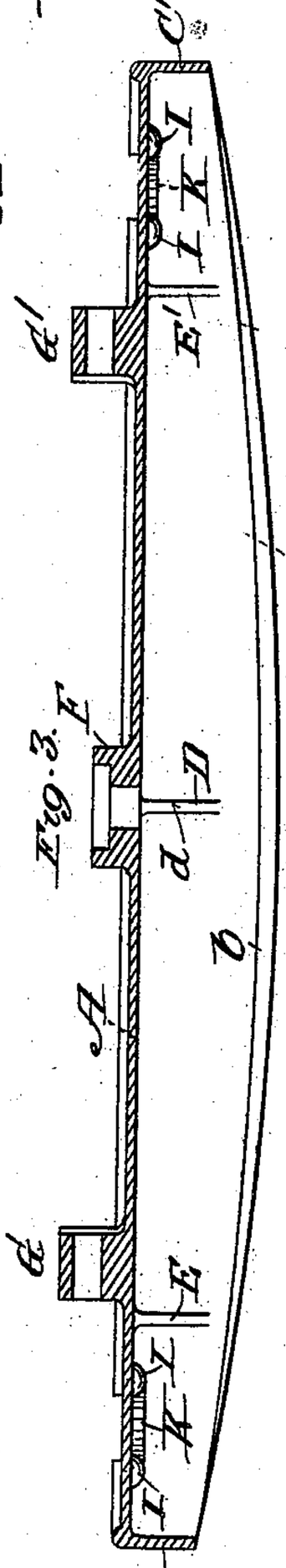
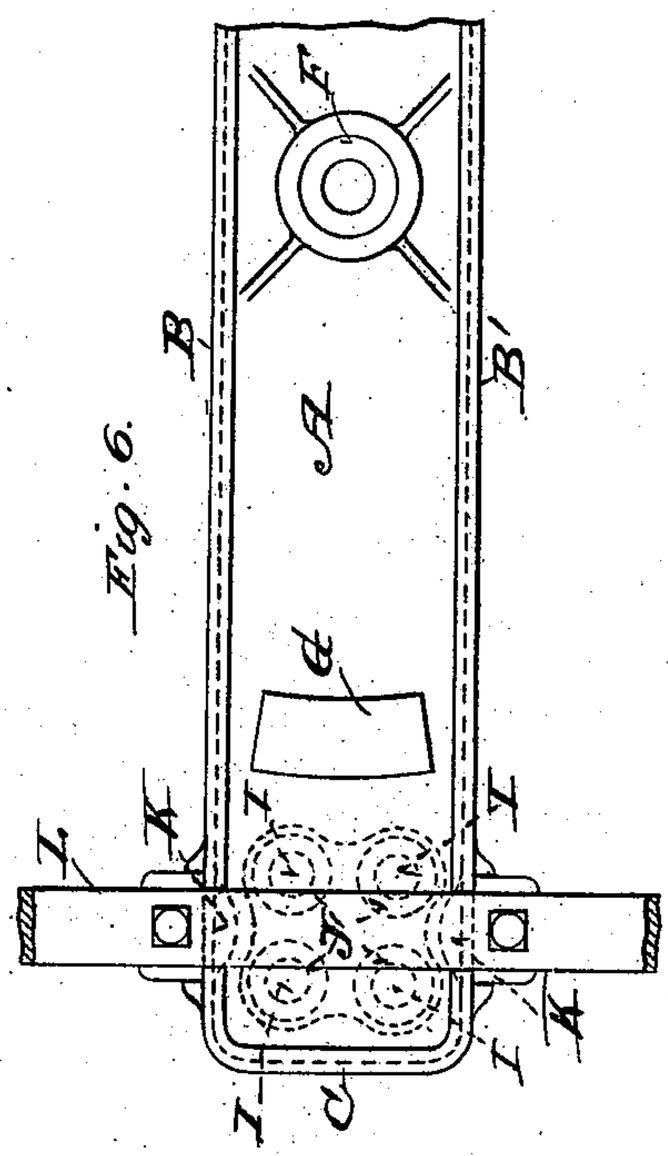



Fig. 6.

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# UNITED STATES PATENT OFFICE.

EDWARD F. GOLTRA AND MORSE B. SCHAFFER, OF ST. LOUIS, MISSOURI.

## CAR-TRUCK BOLSTER.

SPECIFICATION forming part of Letters Patent No. 504,267, dated August 29, 1893.

Application filed June 28, 1893. Serial No. 479,045. (No model.)

*To all whom it may concern:*

Be it known that we, EDWARD F. GOLTRA and MORSE B. SCHAFFER, of St. Louis, Missouri, have jointly made a new and useful Improvement in Car-Truck Bolsters, of which the following is a full, clear, and exact description.

The present invention is in the nature of an improvement upon the construction described in our application for Letters Patent, for an improvement in car truck bolsters, filed January 21, 1893, and numbered serially 459,219.

Our object is to provide at a comparatively low cost, and of a minimum weight, a strong, durable, thoroughly-equipped, metallic car-truck bolster.

To these ends we cast our improved bolster, and in a form whose cross section is substantially of an inverted U-shape, and its various appurtenances—its center and side bearings, and its column-guides, and whatever other features the improved bolster has—are mainly, if not entirely, cast in one piece with the body of the bolster. For we cannot, without incurring so great expense as to render it impracticable, construct such a bolster as we have in mind by stamping or pressing it from sheet-metal, as such material is on the market in the form of sheets of uniform thickness throughout, thus requiring a bolster, if made therefrom, to be of uniform thickness throughout. But this is undesirable in that, if certain parts of the bolster are made sufficiently thick to sustain the strain imposed on them, other parts of the bolster will be unduly thick and heavy. And, again, if sheet metal is used and the various bearings, &c., of the bolster are formed by pressing or setting the metal upward or outward, corresponding, and undesirable, depressions must necessarily occur in the metal on the opposite or inner side of the bolster. And further, and more especially, if the metal is sufficiently soft (a metal having say twelve to sixteen hundredths of one per cent. of carbon, and a plate three eighths of an inch in thickness) to be pressed up sharply without rupture, it would when cold be not only too soft for bearings for use on a car truck bolster but also too soft to enable the bolster itself to retain its form. It is out of the question, also, to form the bolster of ordinary cast iron.

To make a cast iron bolster sufficiently strong necessitates altogether too great a weight of metal. And however heavy it might be made, the bolster for obvious reasons would not be acceptable to railway car-builders. Accordingly we make our bolster a casting of steel, and while it is practicable to employ acid-steel—commonly known as cast-steel—we preferably use basic steel. In the founding of steel however, difficulties are encountered which it is the object of this improvement to overcome.

In smelting steel for casting purposes it is estimated there is required about twice as much heat—that is, a temperature twice as high—as in making ordinary gray iron castings, and there is a corresponding increase in the expansion of the metal. Consequently in cooling twice as much shrinkage occurs as in the case of iron castings and the difficulties arising from shrinkage strains are greatly increased and are frequently insurmountable. In point of fact it is impossible to cast some shapes in steel. Checks and cracks are apt to occur, and however slight they may be they render the casting worthless. We have discovered that if the sides of the bolster under consideration are of the same thickness throughout as that of the top, or the web which unites the sides, when the top or web is of the proper thickness, the sides in cooling check or crack, especially at their lower middle portion. The checks or cracks referred to frequently extend nearly to the top of the bolster. To obviate this trouble we first determine the thickess required in the web to enable it to withstand the strains it has to meet in use, having in view the width of the top which is usually about thirteen and one-half inches, and for such width a thickness of one half an inch is preferable. We then make the sides of the bolster in depth substantially as shown, and in thickness considerably thicker than the top and we prefer to concentrate the excess of metal at the middle lower portion of the sides. In practice we make said portion of each side about two or three times thicker than that of the general thickness of the top and we have found by test that sides of said depth and thickness are sufficient for the heaviest freight cars. These proportions however may be varied somewhat.

Owing to the said construction, the top solidifies sooner than the sides and begins its shrinkage first, and, at the same time the shrinkage of the top is going on, the sides in part at least, are still in a sufficiently plastic or yielding condition, owing to their increased thickness, as stated, to enable them without being ruptured to accommodate themselves to the shrinkage strains exerted by the top, and the continuity of the metal in the sides is not broken. Incidentally the thickening referred to is an advantage also in that it enables the metal to be concentrated in the sides of the bolster, or where it serves to materially and most effectively strengthen the bolster and in point of fact to such an extent as to obviate the need of any auxiliary truss, something necessary in pressed metal bolsters. Again we find the shrinkage referred to to be so excessive as to make it necessary to relieve the casting as much as possible while it is cooling and allow it to draw together unincumbered of the sand of the mold pressing against the sides, or on the top of the bolster, and for this purpose the practice is to loosen the flask containing the casting and to raise the cope of the flask either partly or wholly from off the drag. In doing this the sand is loosened and it often falls away from the sides, exposing the outer face thereof to the air. In consequence of this, the outer part of the sides cools more quickly, and to prevent the sides from warping outwardly, as a result of the described rapid cooling, we insert upon the inner sides of the bolster, brackets, ribs, or corner pieces which serve to connect the bolster sides with the bolster top and thereby hold the sides from warping. In practice these brackets, &c., are inserted at five points: at the center of the bolster, toward its ends, and at its ends. But inserting these brackets as described creates a new difficulty; the brackets in cooling exert a downward strain upon the top and it in turn is inclined to bend downward. To obviate this we place counteracting quantities of metal, such as ribs or other projections, on the upper side of the top, and it becomes convenient to shape and arrange the described projections to enable them to form the side bearings and center plate of the bolster. They are made to cool and shrink simultaneously with the described brackets on the under side of the top, by reason of their being made of a comparatively greater body of metal and their consequent holding of their heat, although being exposed to the air; and thus the top is enabled to cool flat and the entire bolster to be held firmly and to be strengthened after being cooled, and the top to have no undesirable and weakening hollows impressed therein, as is the case with pressed integral bolsters. Again, as soon as the metal has set sufficiently to permit of it, the sand is stripped off the top of the side and center bearings that they may shrink simultaneously (as explained) with the thinner brackets which, though covered and underneath, from their comparative thinness cool quickly. The exposure of the steel thus hot to the air chills it and a good wearing surface for the bearings is thereby provided.

In making the sides of the bolster, they are preferably made thinner at their ends than at the middle thereof, (though they may be the same throughout) as less metal is required in those parts of the bolster. This fact occasions another difficulty which has to be overcome, especially if the metal is highly heated when cast; the end portions of the sides, owing to the described thinness, cool so rapidly, and consequently shrink so rapidly, that oftentimes the bolster sides becomes checked at points between the extreme end of the bolster and the location of the bracket above referred to. However insignificant such a check or crack may be the bolster as stated is condemned. To provide against such an occurrence we place upon the outside of each side of the bolster, between the end of the bolster and the first inner bracket, projections having a sufficient body of metal to keep the bolster side at that part long enough in a plastic condition to enable it to solidify and shrink gradually and draw out without checking. The metal in the projections referred to may be, and preferably is, shaped to form the pillar guides of the bolster. For the same purpose, and to assist the pillar guides, we also place about midway between the end of the bolster and the first inner bracket another projection on the inside which serves also by reason of its shape and in connection with the bosses to keep the springs in position and from moving about.

The annexed drawings, making part of this specification, illustrate the most desirable form of our improved bolster.

Figure 1 is a side elevation of the improved bolster; Fig. 2 a plan of the same; Fig. 3 a vertical longitudinal section on the line 3—3 of Fig. 2; Fig. 4 an end elevation of the bolster; Fig. 5 a vertical cross section on the line 5—5 of Fig. 2; Fig. 6 a plan of the bolster arranged as in use; Fig. 7 an end elevation of the same; and Fig. 8 a section analogous to that of Fig. 5 but showing a modified construction in respect to the disposition of the metal in the sides of the bolster.

The same letters of reference denote the same parts.

A represents the top or web of the bolster, and B, B′, represent the sides of the bolster. These parts constitute what might be termed the main portion or body of the bolster.

C C′ represent the brackets or cross pieces at the ends respectively of the bolster, and they may be styled the bolster-ends.

D represents the bracket at the center of the bolster; and E E′ represent the brackets arranged toward the ends respectively of the bolster.

F represents the center bearing upon the top of the bolster, and G G′ respectively represent the side bearings of the bolster.

The projections, or pillar guides, toward each end of each side of the bolster, are shown at H H.

The end-brackets, C, C′, serve not only to connect the bolster sides with the bolster top, but they also preferably extend entirely across the width of the bolster to unite the bolster-sides directly, substantially as shown. But the inner brackets D, E, E′, preferably have no depth at the middle of the bolster; that is, they are substantially in the form of corner-pieces such as shown at *d d′*, Fig. 5, and arranged at opposite sides respectively of the center of the bolster, and serving to connect the bolster-sides and top, substantially as shown.

The preferred shapes of the various enumerated parts of the bolster are the ones shown. The enlargement of each bolster-side takes the form of the bead *b*, which might be extended its full width throughout the length of the bolster side, but which preferably is made to taper from the middle of the side and to run out as it approaches the ends of the bolster, substantially as shown.

A modification of the enlargement is shown in Fig. 8, in which the excess of metal, in place of being concentrated immediately at the lower edge of the bolster side is, while thickest at the lower edge of the bolster side, distributed more or less throughout the height of the side, substantially as shown.

I I represent bosses upon the inner under side of the bolster-top which the springs, J, at the upper end thereof encircle when the bolster and its associated parts are in position as shown in Figs. 6 and 7, and thereby better kept in place.

K K represent projections upon the inner side of the bolster which assist in holding the springs in place. The described bosses and projections obviate the need of the usual plates and rivets for holding the springs in position.

In Figs. 6 and 7, L represents the customary arch-bar, M the inverted arch-bar, N the pedestal tie-bar, and O O the bolster-columns. P represents the spring-plank. All of these last enumerated parts are constructed and arranged in the ordinary manner saving as modified to adapt them to the improved bolster under consideration.

In addition to the advantages above enumerated of the present bolster that of having its various appurtenances, its center plate, side-bearings, &c., integral, one or more of them with the body of the bolster is obvious.

We claim—

1. A cast steel car truck bolster in cross section of an inverted U-shape and having its sides thickened, substantially as described.

2. A cast steel car truck bolster in cross section of an inverted U-shape and having its sides thickened at the middle lower portion thereof, substantially as described.

3. A cast steel car truck bolster in cross section of an inverted U-shape and having an excess of metal in its sides to cause the top of the bolster, in casting, to solidify sooner than the sides, and having its top and sides integral and connected by integral brackets, ribs, or corner-pieces, and its top provided with integral projections, substantially as described.

4. A cast steel car truck bolster in cross section of an inverted U-shape and having the end portions of its sides made thinner than the central portion thereof, but having integral projections containing sufficient metal to prevent said end portions from cooling too rapidly, substantially as described.

5. A cast steel car truck bolster in cross section of an inverted U-shape and having an excess of metal in its sides to cause the top of the bolster, in casting, to solidify sooner than the sides, and having its top and sides integral and connected by integral brackets, ribs, or corner-pieces, and its top provided with integral projections, and the end portions of its sides provided with integral projections, all cast in one piece, substantially as described.

Witness our hands this 24th day of June, 1893.

EDWARD F. GOLTRA.
MORSE B. SCHAFFER.

Witnesses:
C. D. MOODY,
A. BONVILLE.