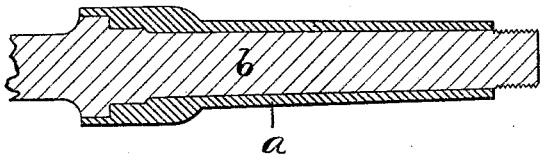
(No Model.)

C. H. SMITH.

AXLE BOX.

No. 303,954. Patented Aug. 19, 1884.



Witnesses:
Edwin F. Dimock.
A. C. Tanner.

Inventor:
Charles H. Smith
By Simonds & Burdett,
Attys.

UNITED STATES PATENT OFFICE.

CHARLES H. SMITH, OF NORFOLK, CONNECTICUT, ASSIGNOR OF ONE-HALF TO ELLSWORTH D. IVES, OF SAME PLACE.

AXLE-BOX.

SPECIFICATION forming part of Letters Patent No. 303,954, dated August 19, 1884.

Application filed December 20, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. SMITH, of Norfolk, in the county of Litchfield and State of Connecticut, have invented a certain new and useful Improvement Pertaining to Axle-Boxes, of which the following is a description, reference being had to the accompanying drawing, where the figure is a view in central vertical longitudinal section of an axle-box constructed in accordance with my invention.

My improvement relates to the class of axle-boxes in common use on vehicles; and it consists in an axle-box made of a peculiar material not heretofore employed for the same or an analogous use and in a special and particular way.

For many years efforts have been made by manufacturers to produce an axle-box that should be durable and comparatively inexpensive, and to that end boxes have been made of cast gray iron that meet the end of cheapness, but are bulky, (to gain strength,) fragile, and so soft as to be quickly worn out. Malleable-iron boxes have been made, and have, in like manner with the cast-iron, been case-hardened, with the undesirable result of brittleness and lack of homogeneity, presence of sand-streaks, and blow-holes. Wrought-metal tubes have been drawn and then upset to shape an axle-box, and then case-hardened, but the fibrous nature of the material when soft, and great brittleness after hardening, have been serious defects; but a great objection is the large cost of axle-boxes of this latter construction. High-grade steel (that in which a large percentage of carbon is present in the alloy) has been tried experimentally; but the excessive brittleness of the material (requiring an undesirable amount of metal for a given size of box, as compared with the wrought-iron box) and presence of blow-holes, that the greatest care in workmanship cannot eliminate, have prevented the use of such axle-boxes. When I began my experiments in this direction I tried various materials, and was met in my efforts to obtain a cast-box of low-grade or Bessemer steel by the statement of other metal-workers that the material could not be cast in such small articles, nor in the desired shape. Experiments proved the error of this, and I finally produced an axle-box of the last-named material. My improved axle-box is made of low-grade steel, (a specific material in the art,) open-hearth, or Bessemer, cast to shape under a process closely analogous to one of these by which small castings are now made of this material, which are free from sand-streaks, free from blow-holes, and homogeneous throughout. After this casting has been made of the special kind of steel, it is then "turned" to the required smoothness and accuracy of bore on the inside, and, if desired, on the outside also, to better fit the hub of the wheel. Then this axle-box is case-hardened upon the inside after the known method of case-hardening iron.

In the accompanying drawing, the letter *a* denotes my improved axle-box, and *b* an axle-arm upon which the box fits in the usual manner.

The so-called "wrought box" above referred to is the one now held to be the best, and, as compared with this, my improved box, herein described, is perfectly homogeneous in texture throughout, which homogeneity is lacking, and must always be lacking, in the wrought-iron article. This homogeneity of my low-grade-steel box makes it case-harden alike over the entire surface, which is not the case with the wrought-iron article, and, of course, this uniformity of hardening throughout on the inner surface makes the axle-box wear with perfect uniformity throughout, which uniformity is absent from the wrought-iron article.

Not only has the improved axle-box described herein the advantages already enumerated over its known best competitors, but it is altogether cheaper in construction, as well as a better article when made, as it is superior to the wrought (and to all cast axle-boxes) in the matter of resistance to tensile and other breaking strains.

By the term "low-grade," as used in the

following claim, I mean to restrict it to the particular and special material now commercially known by that name or as "Bessemer" steel.

I claim as my invention—

As an improved article of manufacture, an axle-box made of low-grade steel, cast and turned to shape, and case-hardened, all substantially, as described, and for the purpose set forth.

CHARLES H. SMITH.

Witnesses:
CHAS. L. BURDETT,
ED. F. DIMOCK.