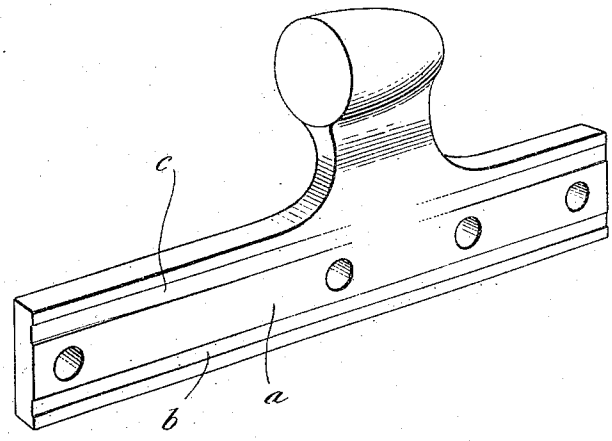
B. WEBER.

PROCESS OF STRAIGHTENING METALLIC CASTINGS.

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1,294,732. Patented Feb. 18, 1919.



WITNESSES:

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PROCESS OF STRAIGHTENING METALLIC CASTINGS.

1,294,732. Specification of Letters Patent. Patented Feb. 18, 1919.

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To all whom it may concern:

Be it known that I, BRUNO WEBER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Processes of Straightening Metallic Castings, of which the following is a full, clear, and exact description.

This invention is a process of treating metallic plates and metallic articles wholly or partially in plate form which may be warped, distorted, or otherwise not in the shape required, in order to flatten, straighten or otherwise convert the plate into the required condition as to shape. As an instance of the application of my process, I may point out that castings wholly or partly in plate form often come from the mold in a slightly warped or distorted condition, and it is desirable to accurately straighten or flatten such plates. When the casting is of malleable metal, such as malleable iron, brass or bronze, the straightening is ordinarily accomplished by a hammering process in which the blow of the hammer is delivered to a large portion, if not the entire surface, of the article with such force as to upset the metal throughout and thus flatten and straighten the plate. The hammering operation is not always certain in its results and does not produce uniform straightening of articles treated in quantity. Furthermore, the use of a hammer (usually a trip hammer) is accompanied by practical disadvantages, such as the necessity of installing it on the ground floor to avoid the effect of noise and the shock and vibration attending the blows of the hammer.

The object of my invention is to provide a process of shaping plates which can be practised without the aid of a hammer and which will turn out a uniform and accurately-shaped product. The straightening process as practised by me consists in first springing the plate against its natural elasticity into the flat or other desired form and then upsetting or condensing the metal of the plate along one or more lines or narrow zones only, in contradistinction to an upsetting of the metal throughout any extended portion of the surface of the plate. By thus restricting the upsetting and condensing of the metal to a comparatively small area in the form of a line or zone, the denser line or lines thus created through and along the plate act as stiffening ribs or stays to retain the plate in the required shape or condition into which it has previously been sprung or distorted against its natural elasticity. It also becomes possible to produce these denser stiffening lines by means of a press instead of by a hammer. Ordinarily, a press cannot be used for applying an upsetting pressure to flat plates because the stroke of the press is definitely determined and the shaft of the press is liable to be sprung before sufficient pressure is applied throughout the surface of the plate to upset the metal. By restricting the upsetting to narrow lines or zones, the face of the press can be formed with projecting ribs or beads corresponding to such lines or zones so that when the pressure is applied the metal of the plate will yield along the lines referred to before any injury will be done to the press. Likewise if the plate varies slightly in thickness, due to imperfections in casting or inaccuracies in a mold or pattern, the ribs or beads on the face of the die will compensate for such inaccuracies by biting deeper or shallower into the surface of the plate corresponding to variations in thickness at different areas.

As an instance of the utility of the invention, I have illustrated in the accompanying drawing in perspective, one leaf of a butt or knuckle hinge as it appears after it has been treated in accordance with my process. An article of this kind, the larger part of which is in plate form, often comes from the mold in a slightly warped or distorted condition and requires to be straightened or flattened. Such articles when made of malleable metal are subject to treatment by my process. Malleable metal possesses a certain amount of inherent elasticity which permits it to be pressed or sprung into a perfectly flat condition when it is found to be warped or otherwise slightly distorted. Such a plate is flattened by means of my process by using a press in which the face of either the upper or the lower die is provided with one or more ribs or beads whose edges are straight and in the same plane. When the pressure is applied to the plate in a press thus constructed, the ribs presented to one side of the plate press thereon until the plate is sprung into the required flat condition; thereafter by a

slight continuance of the stroke the ribs are forced into the surface of the plate thus compressing, condensing and upsetting the metal to the extent of their penetration. Thus the plate, while in its flattened condition, is provided with lines of comparatively dense metal which, when the pressure is removed from the plate, serve as stiffening ribs or stays to retain the plate in the flat condition into which it was converted by the initial pressure.

In the drawing, the plate portion of the hinge is indicated by *a;* it is presumed to be a malleable iron or other malleable casting, and it is shown as provided with two grooves *b* and *c*, respectively, which have been pressed into one face thereof by the ribs or beads on the face of the jaw of the press, as above described, these grooves representing the lines or zones of greater density which act as stays to retain the plate in its required flat form. In the elongated oblong shape of plate shown in this article, the stiffening lines should run longitudinally of the plate in order to follow the direction of the warping or distortion which naturally occurs in this form of plate, since, to be effective, the stiffening lines must be so directed as to resist the return of the plate to its warped or distorted condition after the pressure of the die is removed, and this will best be accomplished by running the stiffening lines approximately in the direction of the curve of the warping. For instance, in the example of the hinge illustrated, as the casting comes out of the mold, the plate portion is usually curved from one end to the other; obviously the stiffening lines must likewise run from end to end, since they could not be effective if they ran, for instance, at right angles to the direction shown.

Inasmuch as these stiffening lines are effective to hold a naturally curved plate in a flat or straight condition, it is obvious that similar stiffening lines will hold a naturally flat or straight plate in a curved condition. It is, therefore, to be understood that my invention extends to a process for converting a flat plate into a curved one, as well as for converting a curved plate into one that is flattened. It is furthermore pointed out that any metallic malleable plate or article wholly or partially in plate form may be given additional rigidity by means of my invention whether it be warped or otherwise distorted or not. In other words, by applying pressure sufficient to condense or compact the molecules of the metal along a line extending through or across the body of a plate, the plate will thereby be naturally stiffened and will better resist tendencies of the plate to be bent or sprung in the direction of such stiffening lines.

The restricted stiffening lines or zones are not necessarily continuous but may be in sections like a dotted or broken line and the lines need not extend entirely across the face of the plate. Owing to uneven thickness of plates, the upsetting will sometimes be less pronounced at some places than at others, an instance of this being shown in the line *c* on the hinge illustrated. This process will be effective with all plates and plate-like articles whose elastic limit will not be overcome by the bending necessary to bring them to the required condition of flatness or shape.

In the pressing process herein described it will be noted that the entire upsetting operation occurs at once and equally throughout the structure of the article treated so that the internal strains produced by the upsetting of the metal are created simultaneously and with balanced relation to one another. This insures that the plate when released from the pressing die will be in the form to which it is sprung or converted by the initial pressure applied before the upsetting occurs.

I claim:

1. A process of reshaping metallic plates and articles wholly or partly in plate form, consisting in springing the plate or article against its elasticity into the required form and then simultaneously upsetting the metal throughout the length of a narrow zone extending across the face of the plate.

2. A process of flattening a warped or distorted plate or article wholly or partly in plate form, which consists in simultaneously condensing the material of the plate along an entire line or lines extending across the face of the plate while the plate is being held in flat condition against its elasticity.

3. A process of flattening a warped or distorted plate or article, which consists in simultaneously condensing the material of the plate along an entire line or lines extending across the face of the plate in substantially the same direction as the curvature of the warping or distortion and while the plate is being held in flat condition against its elasticity.

In witness whereof I subscribe my signature in the presence of two witnesses.

BRUNO WEBER.

Witnesses:
ARTHUR H. SCHLEICHER,
HENRY BUCHNER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."