(No Model.) 4 Sheets—Sheet 1.

F. A. PHELPS, Jr.

MACHINE FOR ROLLING RAILWAY CAR AXLES OR SIMILAR BARS.

No. 590,855. Patented Sept. 28, 1897.

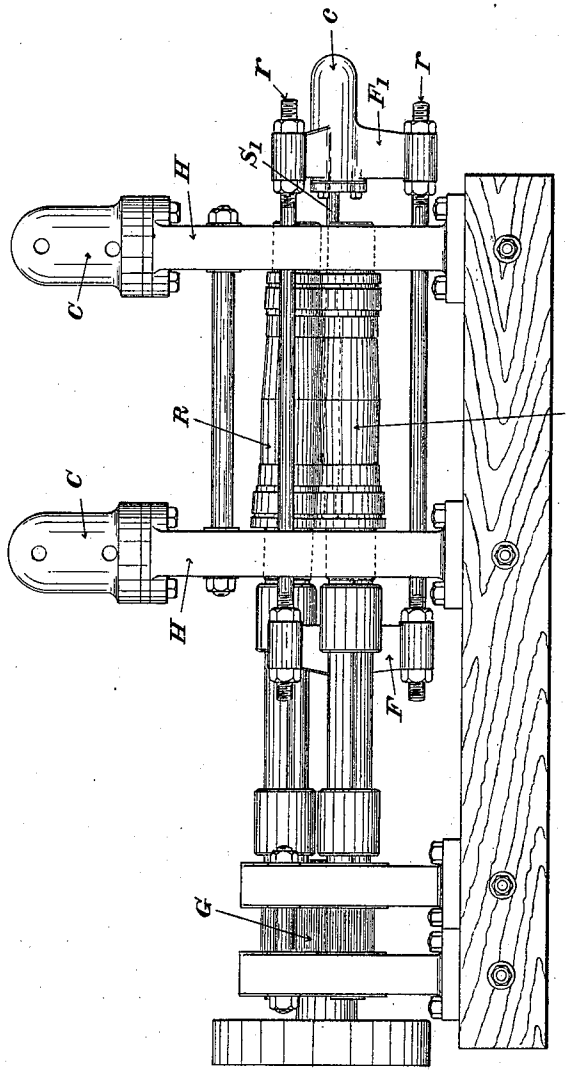


Fig. 1.

WITNESSES:

Heywood Cochran.

H. G. Mantree

INVENTOR

Fred A. Phelps Jr.

BY

Warren Raymond

ATTORNEY.

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(No Model.) 4 Sheets—Sheet 2.

F. A. PHELPS, Jr.

MACHINE FOR ROLLING RAILWAY CAR AXLES OR SIMILAR BARS.

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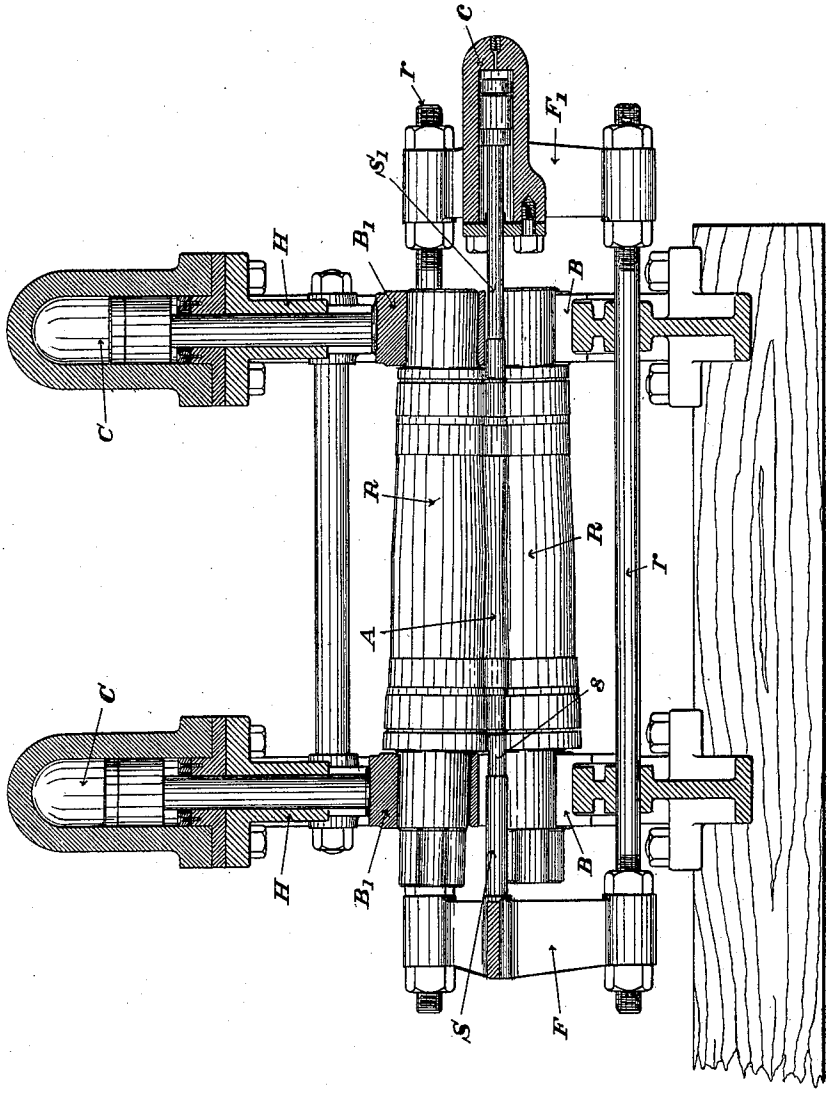


Fig. 2.

WITNESSES:

Heywood Cochran.

A. G. Mantree

INVENTOR

Fred A. Phelps Jr

BY

Warren Raymond

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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F. A. PHELPS, Jr.

MACHINE FOR ROLLING RAILWAY CAR AXLES OR SIMILAR BARS.

No. 590,855. Patented Sept. 28, 1897.

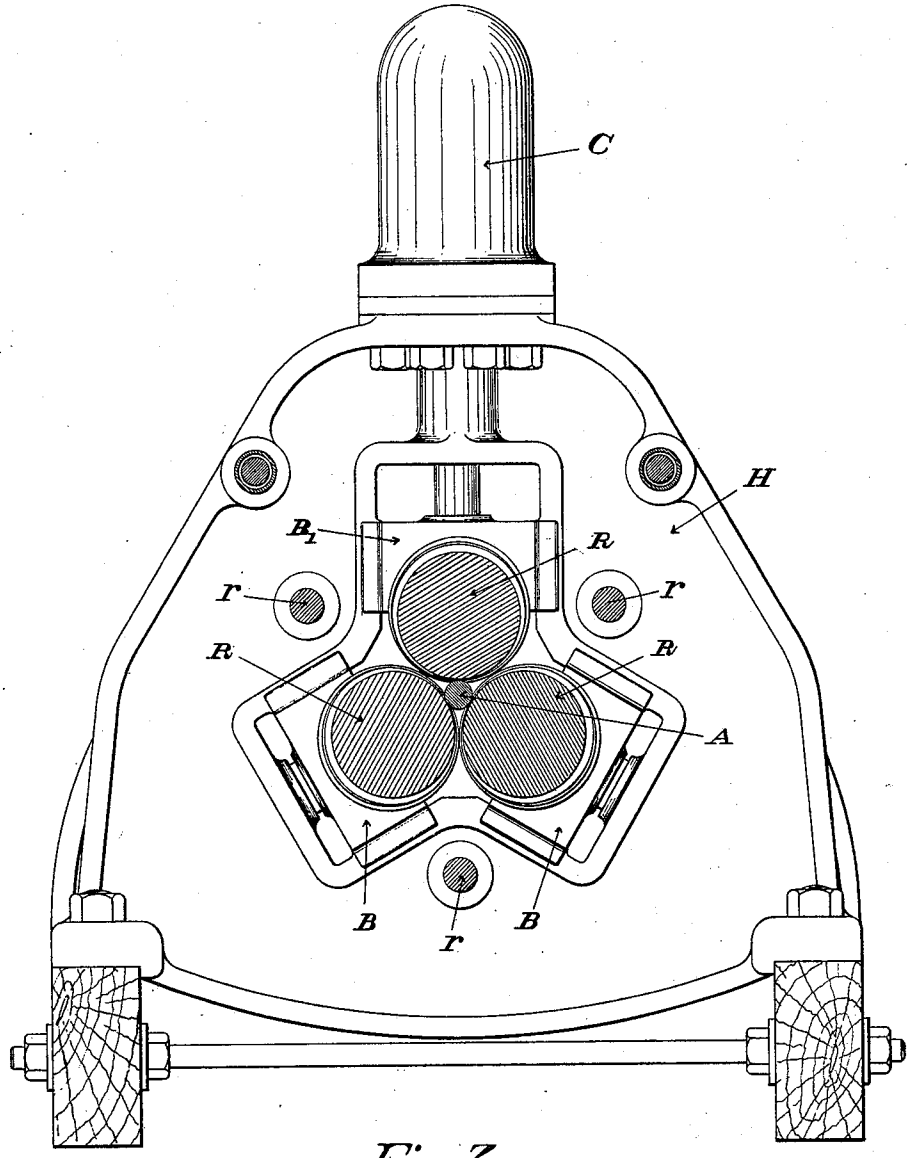


Fig. 3.

WITNESSES:

Heywood Cochran.

A. G. Mantner

INVENTOR

Fred A. Phelps Jr.

BY

Ward Raymond

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

F. A. PHELPS, Jr.

MACHINE FOR ROLLING RAILWAY CAR AXLES OR SIMILAR BARS.

No. 590,855. Patented Sept. 28, 1897.

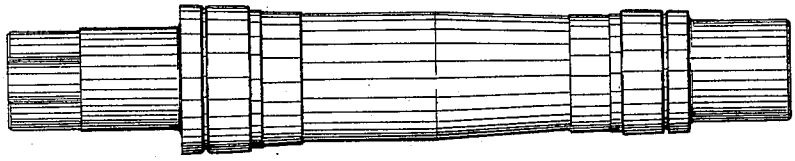


Fig. 4.



Fig. 5.

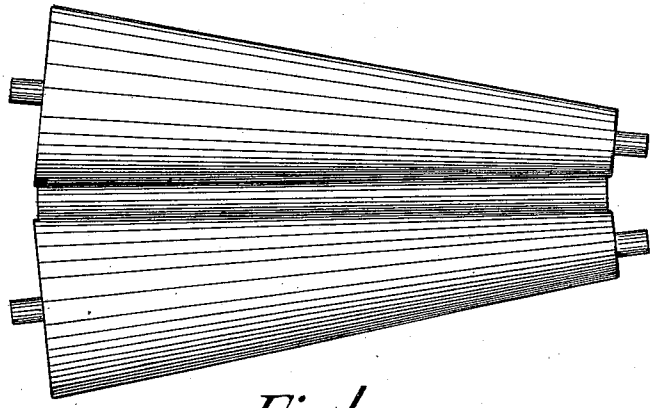


Fig. 6.

WITNESSES:

Heywood Cochran

A. G. Mantner

INVENTOR

Fred. A. Phelps Jr.

BY

Ward Raymond

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRED A. PHELPS, JR., OF JOHNSTOWN, PENNSYLVANIA, ASSIGNOR OF TWO-THIRDS TO T. C. DU PONT, OF SAME PLACE, AND MERLE J. WIGHTMAN, OF SCRANTON, PENNSYLVANIA.

MACHINE FOR ROLLING RAILWAY-CAR AXLES OR SIMILAR BARS.

SPECIFICATION forming part of Letters Patent No. 590,855, dated September 28, 1897.

Application filed March 20, 1896. Serial No. 584,058. (No model.)

To all whom it may concern:

Be it known that I, FRED A. PHELPS, JR., of Johnstown, county of Cambria, State of Pennsylvania, have invented certain new and useful Improvements in Machines for Rolling Railway-Car Axles or Similar Bars, of which the following specification is a true and exact description, due reference being had to the accompanying drawings.

My invention relates to an improvement in machines for rolling railway-car axles or other similarly-shaped metal bars, and has for its object to form these in a novel and improved way, whereby the cost of production may be decreased and a superior article produced.

In general the process to which my invention relates consists in subjecting the blank from which the axle is to be formed to the action of three rolls whose axes are substantially parallel to each other and to that of the bar, and by pressure from the rolls as it revolves between them causing it to assume a shape conforming to that of the rolls.

The object of my invention is to provide a machine having an improved construction, arrangement, and combination of parts to roll axles by the process above outlined.

Referring to the drawings, Figure 1 represents a side view of a machine embodying my invention. Fig. 2 is a longitudinal vertical section through the center of the same. Fig. 3 is a vertical transverse section through the center of the rolls. Fig. 4 shows one of the rolls, and Fig. 5 a finished axle. Fig. 6 is a view to illustrate the twisting action of the rolls.

In the drawings, R are the three rolls, mounted in the housings H. These rolls are so operated by power applied through gearing G that they all revolve in the same direction.

The two bottom rolls revolve in fixed bearings B, but the bearings B′, carrying the top roll, are adjustable vertically by suitable means, as the hydraulic cylinders C.

At each end of the rolls are the spiders or frames F F′, connected by rods *r*. Frame F carries the fixed stop S, which enters the space between the rolls, and carries the end *s*, adapted to revolve freely thereon and to engage the end of the axle-blank A.

Stop S′ in frame F′ is arranged so that it may be moved longitudinally, as by means of hydraulic cylinder C, its end *s′* being adapted to engage the other end of the axle-blank, all as shown in Fig. 2.

The rods *r* are free to slide longitudinally in the housings H, so that when the stop S′ is forced forward until it engages the blank the further admission of water to the cylinder C forces the frame F′ back and through rods *r* draws the frame F and stop S into engagement with the other end of the blank. In this manner the end pressure is always balanced and there is no tendency to force the blank longitudinally as a whole, all the pressure being taken up in compression and upset.

I have said that while rolling the axle I also impart a twist to it. This is for the purpose of strengthening and condensing the material of the axle, as I find that by so treating the blank an axle of superior quality is produced. This twisting of the blank is done to avoid the piping which would otherwise occur. If the blank is not twisted, the pressure of the rolls works that portion of the metal near the rolls more than it does the center portion, thus drawing the outer portions away from the center and producing cavities. The twisting prevents this and produces a molecular arrangement roughly similar to the appearance of the strands of a cable. In this way and by the added aid of the upsetting devices a solid axle may be rolled. To effect this twisting action, I form the rolls slightly larger on one end than the other, whereby a greater surface velocity is secured at that end. This when the blank is firmly gripped between the several rolls causes one end to revolve faster than the other, thus twisting it. This action is illustrated in an exaggerated degree in Fig. 6.

The method of operating the machine is as follows: The rolls being revolved by suitable power the top one is lifted up sufficiently to permit the blank previously heated to be inserted. The roll is then brought down and pressure applied, whereby the blank is

squeezed between the rolls. As they are all revolving in the same direction they cause the blank to revolve and gradually assume a form mating with the configuration of the rolls. I preferably have the blank of such diameter that there is just enough metal in it between the points where the journals are to be to form that part of the finished axle. The blank will not then alter in length between these points, and it will be more easy to form the shoulders and collars on the end portions than were the blank to be constantly changing length. The blank will therefore be smaller in diameter than the largest portion of the finished axle. It is to upset the blank and cause it to fill out these parts and the collars that I provide the stops S S'. As the blank is being rolled I apply force to force the two stops together, the ends *s s'* engaging the blank and revolving with it, and thus exert an end pressure upon the blank, so upsetting it.

The rods *r*, carrying the stops, are to a certain extent free to slide through the housings, and therefore the stops may adapt themselves to any little variation in the position of the blank, and the pressure is applied equally at both ends.

While I have herein described my invention as applied to the manufacture of axles, it will be understood that it is equally applicable to the production of many other like articles.

Having thus described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a machine for rolling metal shapes, in combination, three rolls grouped about a commom center, means for rotating said rolls, means for moving one of said rolls toward and away from the remaining rolls, a frame at each end of said rolls, said frames being connected together, and means for controllably compressing the blank from the ends thereof, all substantially as set forth.

2. In a machine for rolling metal shapes, in combination, a plurality of rolls grouped about a common center, means for rotating said rolls, a movable frame at each end of said rolls, said frames being connected together, a stop in one frame, between the ends of the rolls, and a longitudinally-movable plunger in the other frame in alinement with said stop.

3. In a machine for rolling metal shapes, in combination, a plurality of tapered rolls, grouped about a common center, means for rotating said rolls and means for moving one of said rolls toward and away from the remaining rolls, a stop between one of the ends of said rolls, a longitudinally-movable plunger between the other of the ends of said rolls, said plunger and stop being in alinement with each other, and means for imparting longitudinal movement to said plunger.

4. In a machine for rolling metal shapes, in combination, a plurality of rolls having axes which converge slightly at one end of said rolls, a frame at each end of said rolls, said frames being connected together, a stop in one frame between the ends of the rolls and a longitudinally-movable plunger in the other frame in alinement with said stop, and means for imparting longitudinal movement to said plunger.

In testimony whereof I have affixed my signature in presence of two witnesses.

FRED A. PHELPS, JR.

Witnesses:
WARD RAYMOND,
D. R. MCLAIN.