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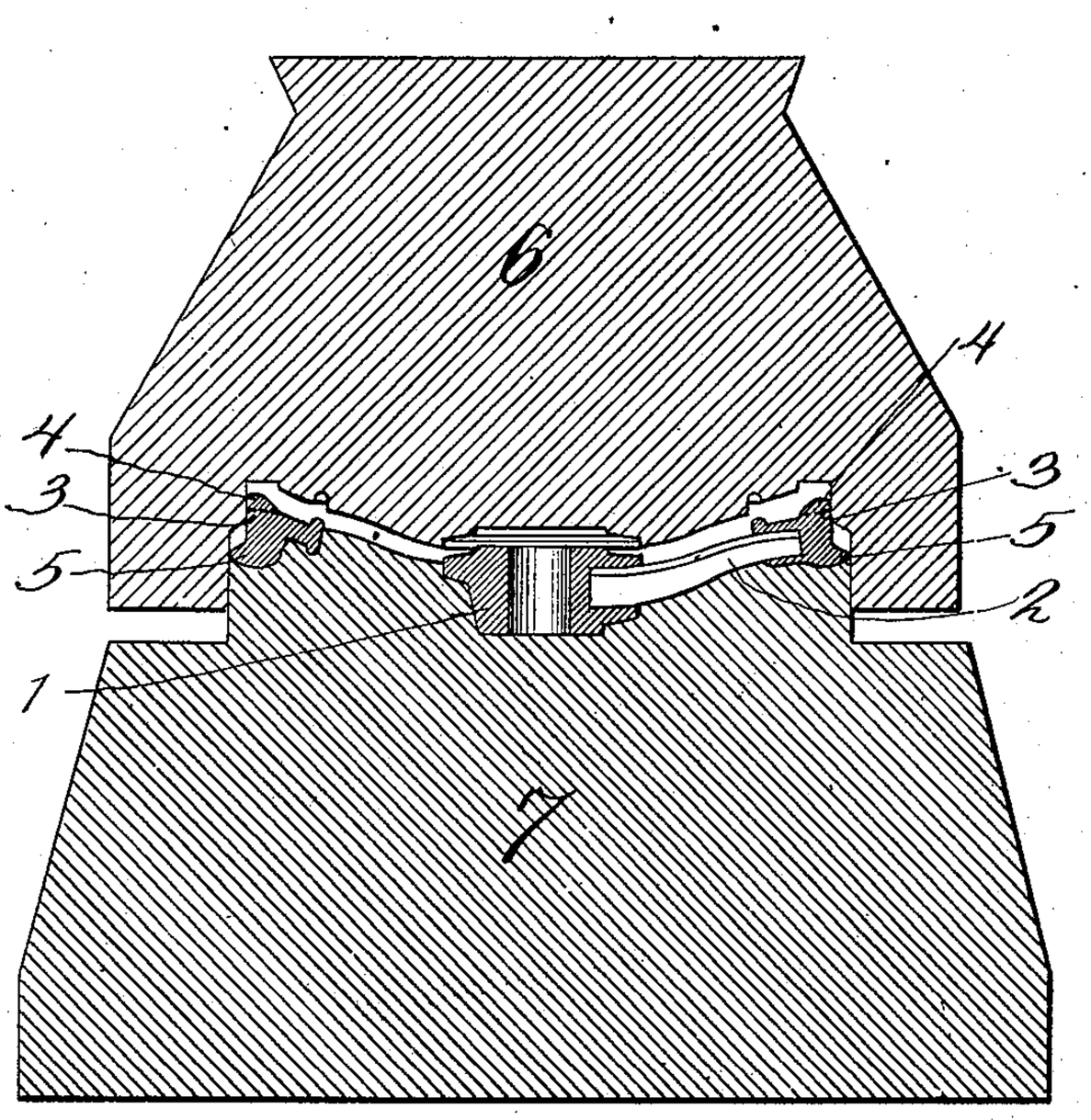
F. E. CANDA.

PROCESS OF MAKING METAL WHEELS.

APPLICATION FILED DEC. 14, 1901.

NO MODEL.



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No. 751,429. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING METAL WHEELS.

SPECIFICATION forming part of Letters Patent No. 751,429, dated February 2, 1904.

Application filed December 14, 1901. Serial No. 85,880. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND E. CANDA, a citizen of the United States, residing in New York, in the county and State of New York, have invented certain new and useful Improvements in Processes of Making Wheels; and I do hereby declare the following to be 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.

My invention relates generally to processes of casting and forging steel wheels, and particularly to processes of casting and forging steel car-wheels.

My invention consists in the novel steps of the process herein described.

In United States Letters Patent No. 605,391, issued to me on June 7, 1898, I have described a steel car-wheel and the method of making the same, which method consists in forming spokes for the wheel from mild or structural steel or wrought-iron, placing the same in the appropriate places in a wheel-mold, pouring molten steel successively into the rim and hub molds, and by the heat of the molten metal and the pressure due to the solidification and shrinking of cast metal welding the spokes into the hub and rim so formed and finally in annealing the wheel. The wheel thereby formed is very strong, and because of the different qualities of steel which may be used for the hub and rim may have a hub soft enough to be bored and a much harder rim, the tread of which will resist wear far better than will the cast-iron wheels commonly in use, since the metal of which it is composed is far more tenacious and contains no soft places, and so is not likely to develop flat spots. Moreover, such a wheel may be made of sufficient strength to carry safely the heavy tonnage cars now in extensive use, for which purpose the common cast-iron wheels are not satisfactory. In the manufacture of such wheels, however, trouble has been experienced from "piping" in the rim—that is to say, the metal of the rim at or near the center is less dense than that near the surface, and there may even be a hollow space or "pipe" at the center. The objects of my invention are to remove this piping and to produce a wheel of great and uniform strength and hardness of tread-surface, and which, moreover, is of uniform size and perfectly cylindrical and has a smooth tread-surface. This object I accomplish by casting the wheel with a rim of as nearly as possible the correct diameter of tread, the rim, however, being broader than that of the finished wheel and having on one side an enlargement, the greatest thickness of which is near the outer surface of the rim, and while the wheel is highly heated placing it within suitable dies and applying great pressure to the rim, so as to compact the metal of the rim, and particularly that near the tread-surface thereof, thereby welding the metal of the rim together in such manner as to remove the piping and condense the metal.

In the accompanying drawing forging-dies by which pressure may be applied to the wheel are shown.

In carrying out the process a wheel, such as indicated by numeral 1 in the accompanying drawing, is cast in the manner described in my said patent, No. 605,391—that is to say, the spokes 2 are formed separately from mild or structural steel, wrought-iron, or other suitable material, are then placed in the spoke-recesses of a suitable wheel-mold, and molten steel or other strong and tough welding metal fusing and solidifying at so high a temperature that in solidifying it will raise the ends of the spokes to a welding heat is poured into the rim and hub portions of the wheel-mold successively. The mold is of such size and form that the cast-steel wheel so produced has a hub of proper size and a rim the thickness and tread diameter of which are substantially that of the finished wheel, but the width of which is somewhat greater than that of the finished rim. In the drawing the wheel is shown in the form in which it is cast and before it is pressed, the dotted line 3 indicating the outline of the rim of the finished wheel and the portion 4 beyond this dotted line representing an enlargement or boss cast

upon the rim and which supplies the metal required to bring the wheel to the correct form when the metal of the rim has been condensed and the pipes pressed out. Preferably the greatest thickness of this enlargement or boss is near the tread of the wheel, so that the metal near the tread may be subjected to the maximum pressure in any event, and preferably the enlargement or boss 4 is formed on what is to be the outer side of the wheel—viz., the side most distant from the flange 5.

In the drawing suitable dies 6 and 7 for pressing the wheel are shown. Preferably their parting-line is along the edge of the flange. Ordinarily it is not necessary to apply pressure to the hub of the wheel as well as to the rim, and therefore the dies are formed accordingly. The mechanism for operating the dies is not shown; but presses suitable for this purpose are well known.

In carrying out the process after the wheel is cast, as above described, it is customarily allowed to cool for convenience, and when it is to be forged is reheated to a welding heat and is placed between the dies and pressure applied to it by means of the dies. The result of the application of pressure is to press the metal of the rim together, condensing it and pressing out the pipes and welding together the walls of these pipes, so that the resulting rim is perfectly solid. Since the maximum thickness of the enlargement or boss 4 is near the tread of the wheel, the metal near the tread has applied to it the maximum pressure and is condensed to the maximum density and hardness. This insures long life and uniform wear of the wheel.

It will be noted that the effect of the pressure is to decrease the width of the rim, but not to increase its thickness or diameter. This is important, because pressure which changes the diameter of the rim might strain or rupture the spokes or break the welds between the ends of the spokes and the rim or hub. As already stated, the wheel is cast with a rim of as nearly the correct diameter and thickness as possible. The pressing brings the wheel to accurate size, however, and insures that it shall be perfectly round and shall have a smooth tread-surface.

After the wheel has been pressed in the manner above described it is removed from the dies and annealed.

Instead of being formed with spokes connecting the hub and rim the wheel may be formed with a continuous plate or web connecting the hub and rim. Such a plate or rim constitutes the substantial equivalent of the separate spokes. The method of carrying out the process is not changed if such a plate or web be used.

The same process may be used for making other kinds of wheels and similar objects as well as car-wheels.

What I claim is—

The herein-described process of making wheels and the like, which consists in forming a wheel with a rim having substantially the diameter of the finished wheel, but having on one side an enlargement, the greatest thickness of which is near the outer surface of the rim, and in then subjecting the rim to pressure in suitable dies, the pressure being applied first to the said enlargement near the outer surface of the rim, the metal near the outer surface of the rim being subjected to greater compression and condensation than the metal near the inner surface of the rim.

In testimony whereof I affix my signature in the presence of two witnesses.

FERDINAND E. CANDA.

Witnesses:

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ALPHONSE KLOH.