(No Model.)

J. M. CASE.

ROLL FOR CRUSHING GRAIN.

No. 293,306. Patented Feb. 12, 1884.

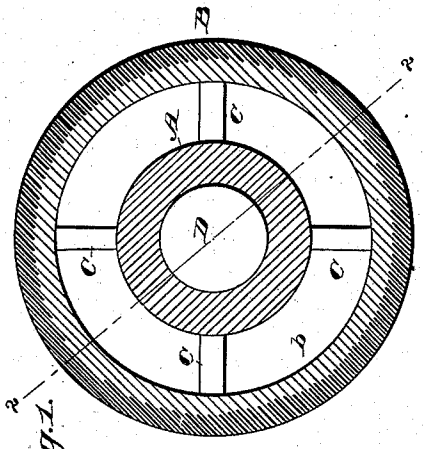


Fig. 1.

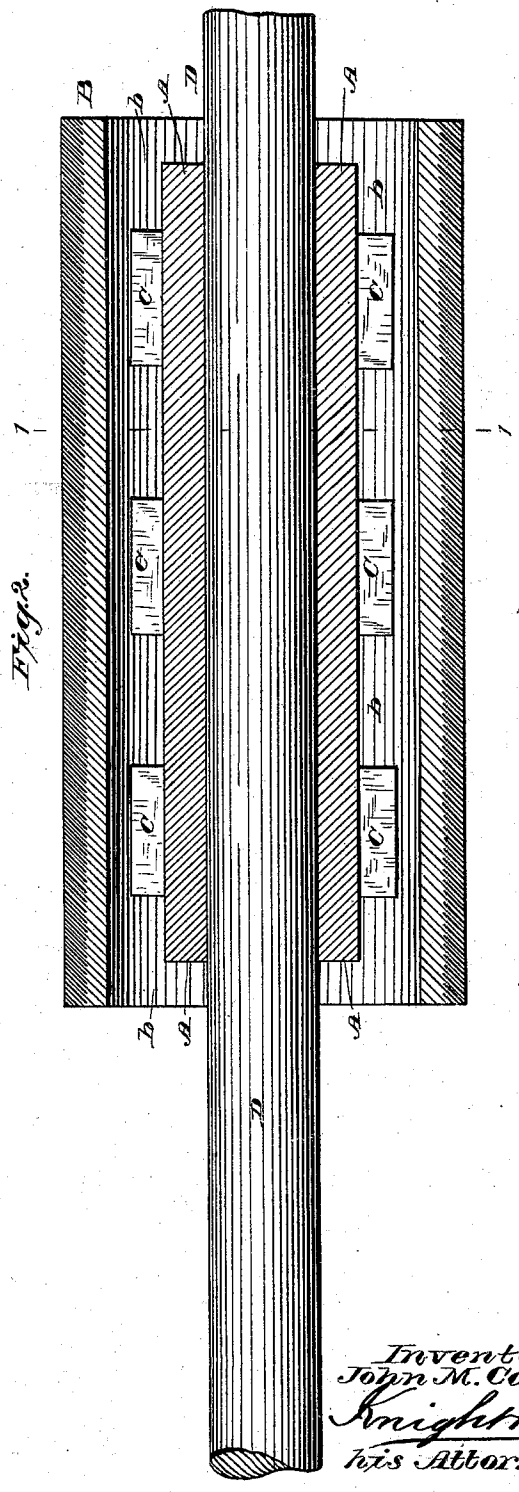


Fig. 2.

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UNITED STATES PATENT OFFICE.

JOHN M. CASE, OF COLUMBUS, OHIO, ASSIGNOR TO THE CASE MANUFACTURING COMPANY, OF SAME PLACE.

ROLL FOR CRUSHING GRAIN.

SPECIFICATION forming part of Letters Patent No. 293,306, dated February 12, 1884.

Application filed April 25, 1883. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. CASE, a citizen of the United States, residing in the city of Columbus, in the county of Franklin and State of Ohio, have invented a new and useful Improvement in Rolls for Crushing Grain, of which the following is a specification.

My invention relates to an improved construction of crushing-rolls for the manufacture of flour. In the manufacturing of flour it is found that iron rolls are superior to millstones, the action of the rolls being to crush the grain into uniform granular particles with less disintegration and mixture with the flour of the bran, germ, and other impurities. The product is thus more granular, whiter, much more free from deleterious matter, less injured by heating, better adapted for making light and wholesome bread, and commands a much higher price in the market. In order to produce rolls at a sufficiently low price with the necessarily hard surface, it has heretofore been proposed to make them of chilled cast-iron. The usual system of making these chilled rolls has been expensive. It consists, first, in casting a solid cylinder from nine to fourteen inches in diameter and generally ten or twelve feet long. These cylinders are cut into lengths of twelve, fourteen, eighteen, twenty-four, thirty, or thirty-six inches, according to the length of the rolls desired, and according to the perfection of the casting. The metal being chilled and extremely hard, the cutting of the cylinder to form the rolls is difficult and expensive. The next step in the manufacture consists in boring holes into each end of the roll, usually two and one-half to three and one-half inches in diameter, into which turned shafts or gudgeons are forced by hydraulic pressure. After this the chilled roll is ready for grinding and polishing, and is in the condition in which my improved rolls leave the mold, as will be hereinafter explained.

The subject of my invention is a hollow roll consisting of two concentric cylinders connected by radial arms, and a shaft of wrought-iron or steel, on which the aforesaid parts are cast, the inner cylinder being of less pure and the outer of more pure metal by reason of the metal being poured at the center and strained in passing through the openings which form the arms, and the outer cylinder having a chilled external surface.

The improved roll constituting the subject of this application is the product of the casting apparatus described and claimed under Letters Patent No. 275,992, dated April 17, 1883. The mode of operation of said apparatus may be briefly described as follows: The shaft of the roll is fixed concentrically within a cylindrical shell of metal projecting from the top and bottom. A cylindrical core is then dropped over the shaft, leaving a space of about an inch around the shaft within the core and an equal space around the core within the mold. The core is provided with contracted radial openings, through which the molten metal may flow from the interior to the exterior cavity and form arms connecting the two concentric cylinders of which the hollow roll is formed. The metal being poured at the center and flowing outward, the tenacious nature of slag and other impurities in the iron causes them to cling to the core, while the molten metal passes through the contracted passages therein, so that the impurities are in effect strained out, and the outer cylinder, where the working-surface of the roll is formed, is made up of the purest metal, and is chilled by contact with the polished surface of the metal mold, so as to become very hard and smooth.

In the accompanying drawings, Figure 1 is a transverse section on the line 1 1, Fig. 2, of a roll embodying my invention. Fig. 2 is a longitudinal section of the same on the line 2 2, Fig. 1.

A represents the inner shell or cylinder of my improved hollow chilled roll; D the shaft on which it is cast, and B the outer shell or cylinder concentric therewith, forming an annular chamber, *b*, between the cylinders. The inner and outer cylinders, A and B, are secured together by a series of small radial "strainer arms," C, of any preferred form, and arranged in any suitable manner. These cylinders and arms may be formed by pouring the molten metal within a perforated cylindrical combined strainer and core such as described in my application for Letters Patent hereinbefore referred to. The small radial arms C may be of any suitable form in transverse section. It is found in practice that rolls

with the shaft cast in and made hollow and having the outside rim chilled can be made for one-quarter the expense of solid rolls cast in the usual manner, while in use they possess great superiority, for the following important reasons: First, there is less than half the weight of metal, and consequently the wear is much less on the bearings; secondly, the rolls being hollow, means are provided for the radiation of heat, so that a hollow roll is found to run cool, while the solid rolls become very hot, and when once heated require a long time to cool; hence the hollow roll can be handled with ease, and, for the various reasons named, greatly reduces the first cost of the machine as well as the cost of running and maintaining and repairing it; thirdly, my invention entirely obviates the difficulty and loss often encountered by the end shafts or journals of mill-rolls working loose, necessitating a suspension of work, removal of the roll, and sending it to the factory for the setting of a larger shaft, after which it must be reground and polished; fourthly, it is found that the surface of the hollow roll becomes much more effectively chilled than that of a solid roll, for the reason that the latter takes much longer to cool, imparts more heat to the mold, and, by the large amount of heat retained, tends to anneal the metal after it is set.

I do not claim novelty in the general principle of casting wheels, rollers, and the like by pouring the metal from the center outward, so as to retain the impurities near the center, as I am aware that this has before been practised in various ways; nor do I claim novelty in the parts of my roll separately considered; but I am not aware that such a skeleton roll cast upon a wrought-iron shaft and having an externally-chilled cylindrical surface formed of pure metal by straining the molten metal through the radial cavities which form the arms of the skeleton roll, thus retaining all the impurities of the metal within the central hub, which is cast directly upon a wrought-metal shaft, has ever existed before.

What I claim, therefore, and desire to secure by Letters Patent, is—

The hollow roll herein described, consisting of an externally-chilled cylinder, B, of strained metal, an inner hub, A, of less pure metal, connecting-arms C, and a wrought-iron or steel shaft, D, on which the aforesaid parts are cast, as herein set forth.

JOHN M. CASE.

Witnesses:
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