(No Model.)

I. W. COOPER.

SHEET AND PLATE ROLL.

No. 271,605. Patented Feb. 6, 1883.

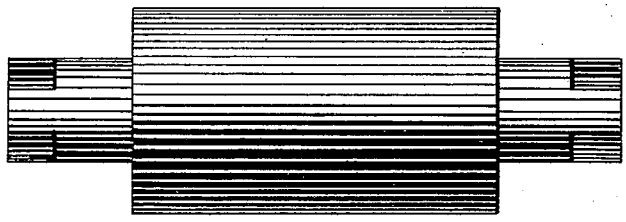


FIGURE 1

FIGURE 2

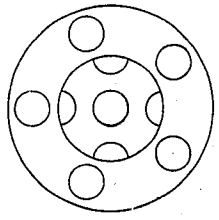


FIGURE 3

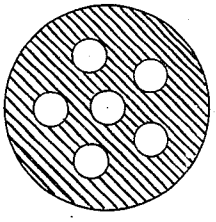
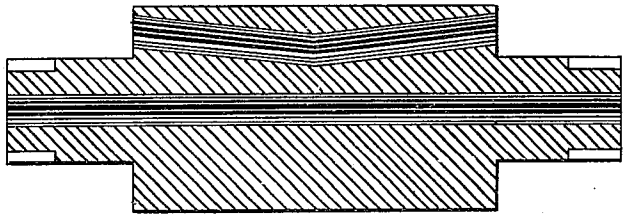


FIGURE 4



Witnesses -

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UNITED STATES PATENT OFFICE.

ISAAC W. COOPER, OF APOLLO, PENNSYLVANIA.

SHEET AND PLATE ROLL.

SPECIFICATION forming part of Letters Patent No. 271,605, dated February 6, 1883.

Application filed May 29, 1882. (No model.)

To all whom it may concern:

Be it known that I, ISAAC W. COOPER, a citizen of the United States, residing at Apollo, in the county of Armstrong and State of Pennsylvania, have invented certain new and useful Improvements in the Manufacture of Sheet and Plate Rolls; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part thereof, in which—

Figure 1 indicates a plan view of my improved sheet or plate roll. Fig. 2 indicates an end view of the same. Fig. 3 indicates a transverse section through the middle of the roll, and Fig. 4 indicates a central longitudinal section through the same.

Like letters of reference indicate like parts wherever they occur.

My invention consists in a new and useful mode of constructing sheet and plate rolls for rolling iron, steel, and other metals; and the object of the improvement is to construct the rolls in such a manner as to provide for their expansion and contraction, and thereby prevent rupturing strains from coming upon them during their use; secondly, to construct the rolls in such a manner as to impart to them the greatest amount of strength with the employment of a decreased amount of material in their manufacture; and, thirdly, to provide the rolls with such a form as to admit of their manufacture without producing the permanent and severe internal strain upon the metal which ordinarily takes place after casting and during the contraction of the large masses of the solid metal constituting the body of ordinary rolls.

Heretofore, so far as I am aware, soft and chilled rolls for sheet and plate trains have been produced by casting the metal in a solid mass. This, as a matter of course, rendered them heavy and difficult to handle in their removal and replacement in their housings; and, in addition to this, another and a very serious defect was produced—namely, in casting large solid masses very serious permanent rupturing strains are produced during shrinkage, as the surface sets first, and the shrinkage must then mainly take place from the center to the surface, or the hotter metal at the center will be prevented from shrinking properly, and in either case the metal at the interior will be weakened, and permanent rupturing strains will exist in the roll, which will render it liable to give away at any moment during its use, as it will then be subjected not only to sudden shocks, jars, and pressure, but to unequal heating and expansion and contraction during the rolling operation.

To the end, therefore, that a stronger, cheaper, better article, free from internal strains, may be produced, and that it may be better able to withstand contraction and expansion during its subsequent use, I cast the roll preferably with a hollow center and with a series of perforations arranged between the chill and the hollow center and at an equal distance from each other. These series of perforations may consist of any suitable number and diameter of apertures passing at a suitable distance below the face longitudinally through the body of the roll; and each aperture should preferably extend from its ends to its center in lines which bisect each other in line with the middle of the roll, as is indicated by the longitudinal section shown in Fig. 4.

The advantages of my improvement are: first, less metal is used; consequently the rolls may be made cheaper; secondly, the rolls are lighter, and are more easily handled and removed and replaced from and in their housings; third, although lighter, the rolls are very strong, because the strain which comes upon them during rolling (aside from torsion and contraction and expansion) is of a crushing nature, and it is a well-known fact that a cast-iron cylinder or a cast-iron body provided with a series of circular perforations can resist enormous strains of that character; fourth the contraction of the metal at the interior of the roll after casting and during setting is more uniform, and permanent rupturing strains in the roll are practically avoided; fifth, the resistance to the expansion and contraction of the surface of the roll (the part which gets hottest and cools quickest in any given time, and consequently tends to expand and contract more and quicker than the central portion of the roll) is far below that of a solid roll; sixth, the greater surface exposed to the action of the air by the use of the longitudinal apertures allows the heat to escape or radiate faster from the chill dur-

ing rolling, and consequently the surface cannot expand as much or as fast as in ordinary cases; hence there is less liability of breaking the rolls during their use; and, finally, by combining all these advantages a roll is produced that is not liable to break during service from the effects of expansion and contraction, and time, labor, and money are saved both to manufacturers and employés.

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

1. A sheet or plate roll provided with a series of apertures extending longitudinally below the chill or surface, substantially as and for the purpose herein specified.

2. A sheet or plate roll having a hollow center and provided with a series of longitudinal apertures arranged at regular distances from each other, and extending longitudinally at a suitable distance below the chill or surface of the roll, substantially as specified.

3. A sheet or plate roll provided with a series of apertures at regular distances from each other and extending longitudinally through the roll at a suitable distance from the surface or chill, the lines of direction of the perforations intersecting each other on a line passing transversely through the roll at or near its middle, substantially as and for the purpose specified.

4. A sheet or plate roll having a hollow center, and provided with a series of apertures at regular distances from each other and extending longitudinally through the roll, said apertures inclining from the ends toward the center of the roll, substantially as and for the purpose herein set forth.

ISAAC W. COOPER.

Witnesses:
FRANK M. REESE,
WM. HENRY.