(No Model.)

F. G. & A. C. SARGENT.

METALLIC ROLLER.

No. 507,332. Patented Oct. 24, 1893.

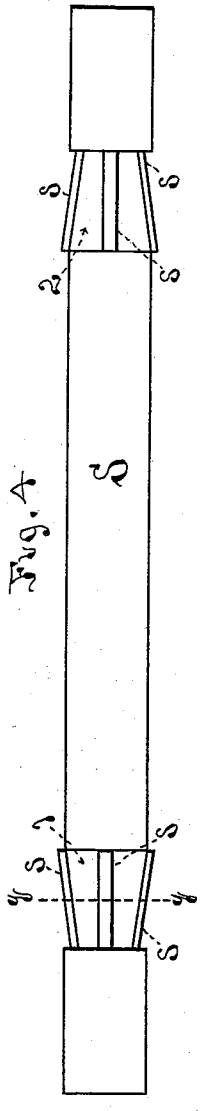

Fig. 4

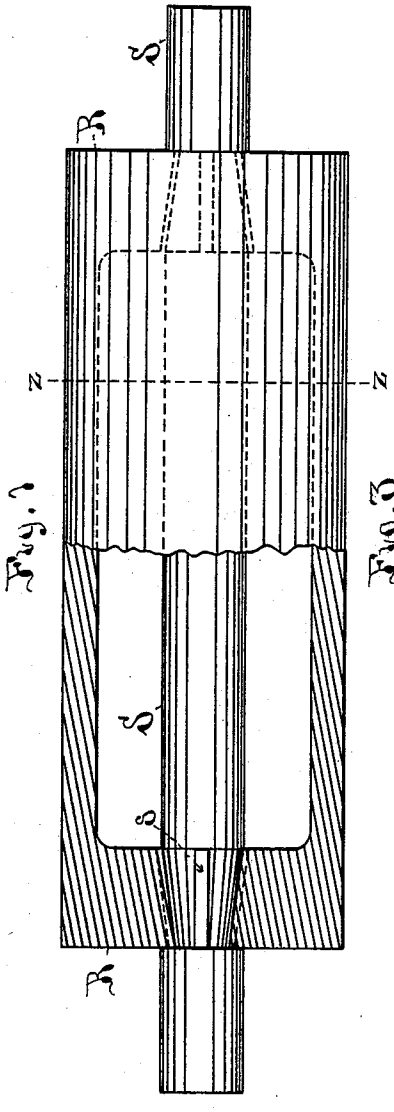

Fig. 1

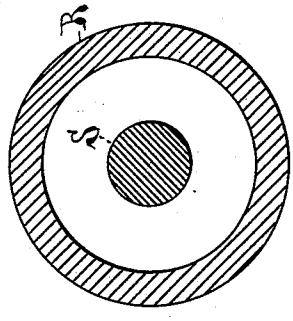

Fig. 3

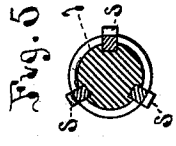

Fig. 5

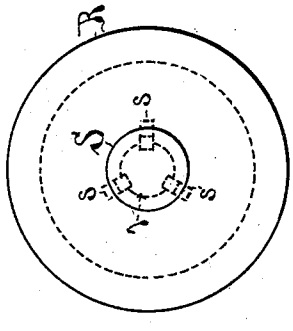

Fig. 2

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UNITED STATES PATENT OFFICE.

FREDERICK G. SARGENT AND ALLAN C. SARGENT, OF GRANITEVILLE, MASSACHUSETTS.

METALLIC ROLLER.

SPECIFICATION forming part of Letters Patent No. 507,332, dated October 24, 1893.

Application filed February 17, 1892. Serial No. 421,883. (No model.)

To all whom it may concern:

Be it known that we, FREDERICK G. SARGENT and ALLAN C. SARGENT, of Graniteville, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Metallic Rollers, of which the following is a specification.

Our invention relates to a new metallic roller for various purposes, such as squeeze rolls for wool-washing machines, or pressure rolls for squeezing or pressing substances in other machines used in a similar manner, as a new article of manufacture when constructed according to our process substantially as hereinafter described and claimed.

In the drawings: Figure 1 is a side view of a squeeze roller constructed according to our invention, and shown partly in section. Fig. 2 is an end view of the same. Fig. 3 is a cross-section through the same on the line *z*—*z*. Fig. 4 is a side view of the shaft of the roller before the latter is formed upon it. Fig. 5 is a cross-section on the line *y*—*y* of Fig. 4.

R is the body of the roller made of cast metal.

S is the shaft of the roll, upon which the body is to be formed by casting. This shaft is usually made of wrought metal, as steel or iron for instance, but it might be of cast metal in some cases.

In forming our improved roller we first construct the shaft, S, as shown in Figs. 4 and 5, with the opposite bevels 1, 2, upon the parts where the metal forming the body of the roller is to be cast upon the shaft. These bevels are in the shape of the frustum of a cone in the shaft, as shown, although the shaft might be made square in those parts and the bevel portions be formed in the shape of the frustum of a pyramid. In all cases, however, the larger ends of the frustums are turned toward each other for the purposes hereinafter described. In these beveled portions 1, 2, we place the splines, *s*, *s*, in grooves cut in the shaft for the purpose of holding the body of the roller more firmly to the shaft, when it is cast upon it the same as the frustum of a pyramid would. We prefer to use two or three splines set in opposite sides of the shaft, although one might be used, if preferred. It will be observed that the ends of these splines which are adjacent the middle part of the shaft are wider apart than the other ends, which allows of the free shrinkage of the roller upon the shaft. It will also be observed that these splines present polygonal faces to the metal of the roller surrounding them, the same as the frustum of a pyramid, which serve to prevent the roller from turning upon its shaft when cast thereon as hereinafter described.

The shaft having been thus prepared is placed in a suitable mold, either of sand, or of metal if its surface is to be chilled and has a sand core formed around its central portion between the bevels, in the usual manner, although this may be omitted and the body, R, of the roll be formed solid around the shaft if desired. The body part, R, of the roll is then cast upon the shaft, so that the molten metal will come in contact with and surround the frustums of the cones and form the ends of the roller encircling the same. As the molten metal, from which the body part of the roller is cast, begins to cool, it tends to shrink away from the conical portions of the shaft and leave a certain looseness of the body of the roller thereon, and if these portions of the shaft were cylindrical this shrinkage of the metal would sensibly affect the closeness of unity of the roller and its shaft, but as these portions of the shaft are conical, with the larger ends of the conical parts toward each other, the metal forming the body part of the roll, as it cools, also shrinks in the direction of its length and draws the partially cooled metal of its ends surrounding the conical portions of the shaft, toward each other, bringing the parts of this metal surrounding the shaft upon a larger part of the cone at each end, and causing it to hug the shaft even closer than if there had been no shrinkage and the metal were cast upon a cylindrical shaft. This compression of the portions of the cast metal of the body of the roller by the longitudinal shrinkage serves to consolidate it and make it more dense immediately around the shaft than it would otherwise be, and causes it to grip the shaft so tightly as to form a complete unity therewith. It also serves to compress the splines *s*, *s*, very tightly in their seats in the shaft and cause the metal of the roller to hug them with great force on their polygonal

faces, thus forming a perfect unity between the body of the roller and its shaft, from the actual absence of backlash between them, when the metal has finally cooled. We thus produce a squeeze roller of superior quality, which has its cast metal body so united to its wrought metal shaft, S, that it can never be detached therefrom except by breaking the roller, and the compression frequently welds the cast metal to the shaft to a certain extent under the great pressure of the longitudinal contraction of the body of the roll while in the process of cooling.

Care should be taken that the conical portions of the shaft, when prepared for the casting of the body of the roll thereon, be not made of so steep a pitch as to cause the strain of longitudinal contraction to split or weaken the roll in its central part, while being sufficient to unite the cast portions of the roll firmly to the shaft. Different grades of metal as well as different metals contract somewhat differently, and it is impossible to give any one angle of inclination of the conical portions of the shaft to its axis, which will accommodate all metals, or all grades of the same metal in casting, but the operator can easily determine by experiment the precise angle of inclination of the conical portions which will effect the best result.

When the roll and its shaft are constructed in this manner, as a new article of manufacture, it will be easily distinguished from other rollers by the superior unity of the shaft and roll and by its superior durability in use on account thereof.

If the frustum of a pyramid be employed instead of a frustum of the cone as above described, it might be found sufficient to use only two opposite inclined faces of the pyramid and omit the other two, relying upon the longitudinal shrinkage of the metal to draw the portions cast around these faces against them as described. Also, it might be sufficient to use opposite faces of the frustum of the cone of larger diameter than the shaft, leaving a portion of the shaft cylindrical and allowing the shrinking of the metal longitudinally to draw it against these opposite inclined faces of the frustum of a cone; but we prefer the construction shown. This same principle is applicable to other cylinders which are mounted on shafts that revolve with them, such as pulleys, wheels, &c., of metal.

What we claim as new and of our invention is—

As a new article of manufacture, a cylinder, formed of a continuous shaft provided with opposite inclined polygonal faces in the shape of a frustum or partial frustum toward its ends, having their larger ends turned toward each other, and with the body part formed of metal cast thereon and shrunk against the frustums and faces by its longitudinal contraction, while cooling substantially as described.

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