

UNITED STATES PATENT OFFICE.

FRANCIS CURTIS, OF MALDEN, MASSACHUSETTS.

IMPROVEMENT IN ROLLS FOR PRESSING, SIZING, AND CALENDERING PAPER.

Specification forming part of Letters Patent No. 51,929, dated January 9, 1866.

To all whom it may concern:

Be it known that I, FRANCIS CURTIS, of Malden, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in India-Rubber Rolls for the Manufacture of Paper; and I hereby declare that the following is a full, clear, and exact description of the same.

In the manufacture of paper by machinery three principal and important operations are effected by means of rolls. When the pulpy mass is deposited on the wire-cloth it is first carried to a couple of wet-press cylinders, which give the gauze, with the pulp upon it, a slight pressure, which is repeated upon a second pair of wet press-rolls similar to the first. The web of the paper while yet in a wet state is then conveyed, by an endless felt, between cast-iron cylinders, which, by subjecting it to severe pressure, expel the water that remains in the web, rendering it sufficiently firm to be handled. A second pair of press-rollers is generally used to remove the mark of the felt from the under surface of the paper. This operation, which may be simplified or modified, according to circumstances, is carried out by means of press-rolls which, previous to this my invention, were generally made of cast-iron, the objections to which consisted in their liability to corrode on the surface, owing to the chemical action of the ingredients used in the bleaching and other preliminary operations on the pulp. Also, because they are necessarily run wet, the effect of which is that the rolls become very rough and sharp, which not only seriously affects the surface of the paper, but rapidly wears out the woolen felting which passes with the paper between the surfaces of the iron rolls. On the other hand, the corrosion takes place by the formation, upon the surface of the rollers, of a pellicle of iron-rust, which, on coming in contact with the paper, marks it with iron-rust, rendering it unfit for use. Streaks of such iron-rust are formed by the steel or iron scraper, called "doctor," the office of which is to keep the top roll free from accumulation of fibrous matter. This action of the doctor loosens the rust and deposits it upon the sheet as it passes between the rollers. To obviate these difficulties in the manufacture of paper, it is true, brass or copper rolls have been used;

but the great expense of such rolls is a bar to its introduction in paper-mills, and does not compensate for the losses accruing from the causes before stated.

The object of my invention, therefore, is to protect the surface of iron rolls by coating the same with a substance which is not affected by the acids or alkalies, and which, in point of durability—that is, permanency of surface—equals or excels the best copper roll, and which, moreover, is capable of a high polish or finish; and this I have accomplished, after numerous experiments and continued tests, by covering the iron with hard rubber or vulcanite. The manner in which the same is or may be constructed is well known to manufacturers of hard-rubber articles, and no special reference to the manufacture of iron rollers covered with hard rubber is here needed. It may suffice to say that the hard-rubber compound may be applied in sheets wound around the cylinder or roller, the surface of which is roughened or otherwise made to cause the coating firmly to adhere thereto after vulcanization.

Instead of covering an iron roller with rubber, as described, the roller may be entirely made of rubber, it being wound around a shaft of a square or other angular sectional area.

Hard-rubber rolls, such as described, of perhaps large diameter, may also be used for the finishing operations, such as calendering the paper. As heretofore made calender-rolls, for calendering fine paper, particularly, are composed of compressed paper—that is to say, paper pressed by hydraulic pressure onto an iron shaft until the requisite hardness is attained, when they were turned and polished. The objection to these rolls, besides their high cost, is that they are easily affected by the atmosphere, the dampness rendering them soft, destroying the smoothness of the surface, while if too dry the paper shrinks and becomes loose on the shaft. They are also liable to be creased or uneven on their surface. Hard-rubber rolls are entirely unaffected by the atmosphere and are capable of receiving a far higher polish, consequently capable of imparting a better, harder, and smoother surface to the paper as it passes through them, and are much more durable, not liable to be creased or become uneven, and much more easily kept in repair.

The third and last application of rubber rolls in the manufacture of paper consists in its substitution for the wooden sizing-rolls heretofore used, which were constantly getting rough and uneven.

Having thus described my invention, I claim—

1. As a new manufacture, the employment of hard-rubber rolls in pressing, calendering, and sizing paper.
2. As a new article of manufacture, press,

calendering, and sizing rollers, to be used in the manufacture of paper, when made of hard rubber, or of iron or any other material covered with hard rubber.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

FRANCIS CURTIS.

Witnesses:

FREDERICK CURTIS,
C. A. SWADKINS.