(No Model.) 3 Sheets—Sheet 1.

H. C. SPALDING.

APPARATUS FOR WATERPROOFING PAPER, &c.

No. 345,003. Patented July 6, 1886.

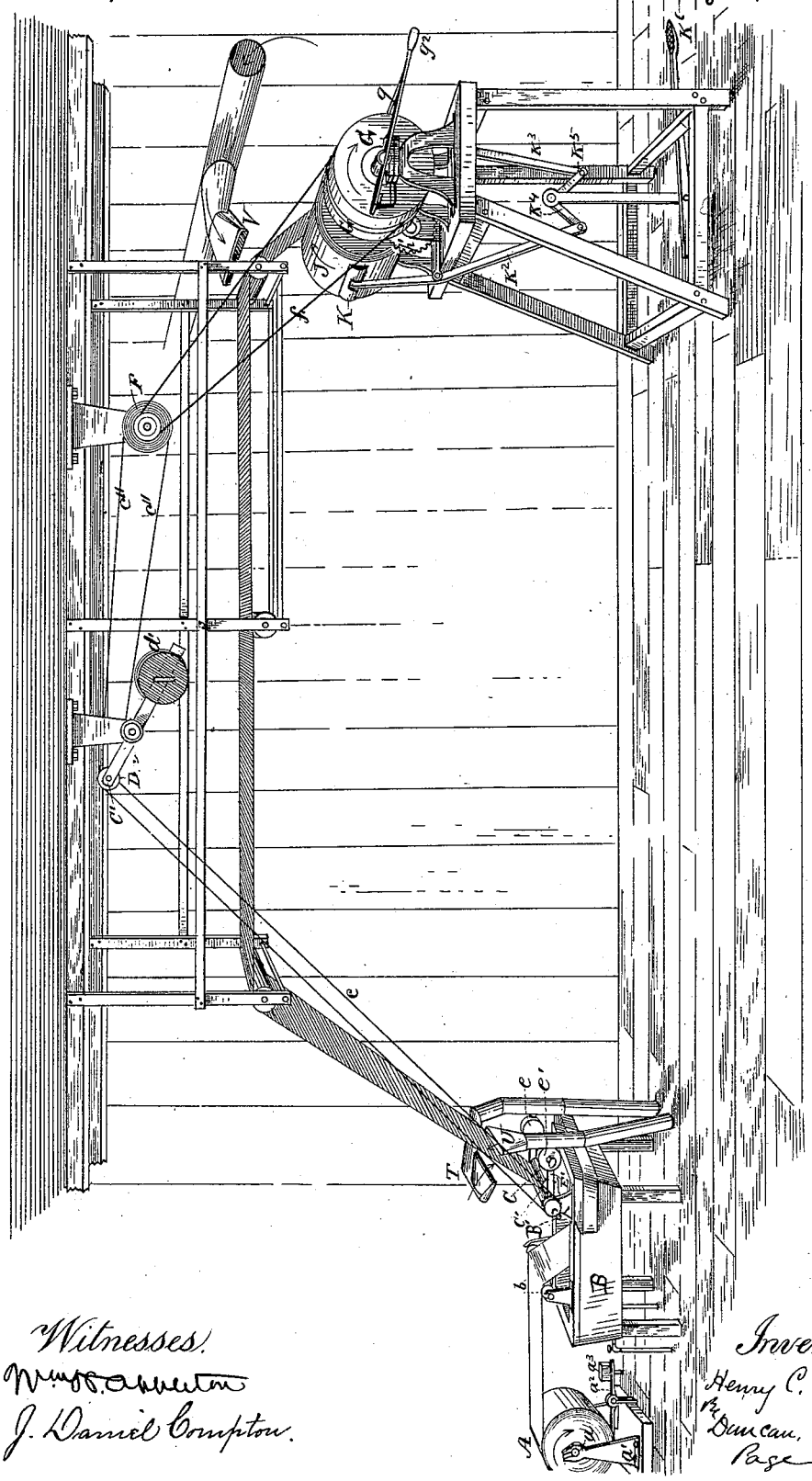

Fig. 1.

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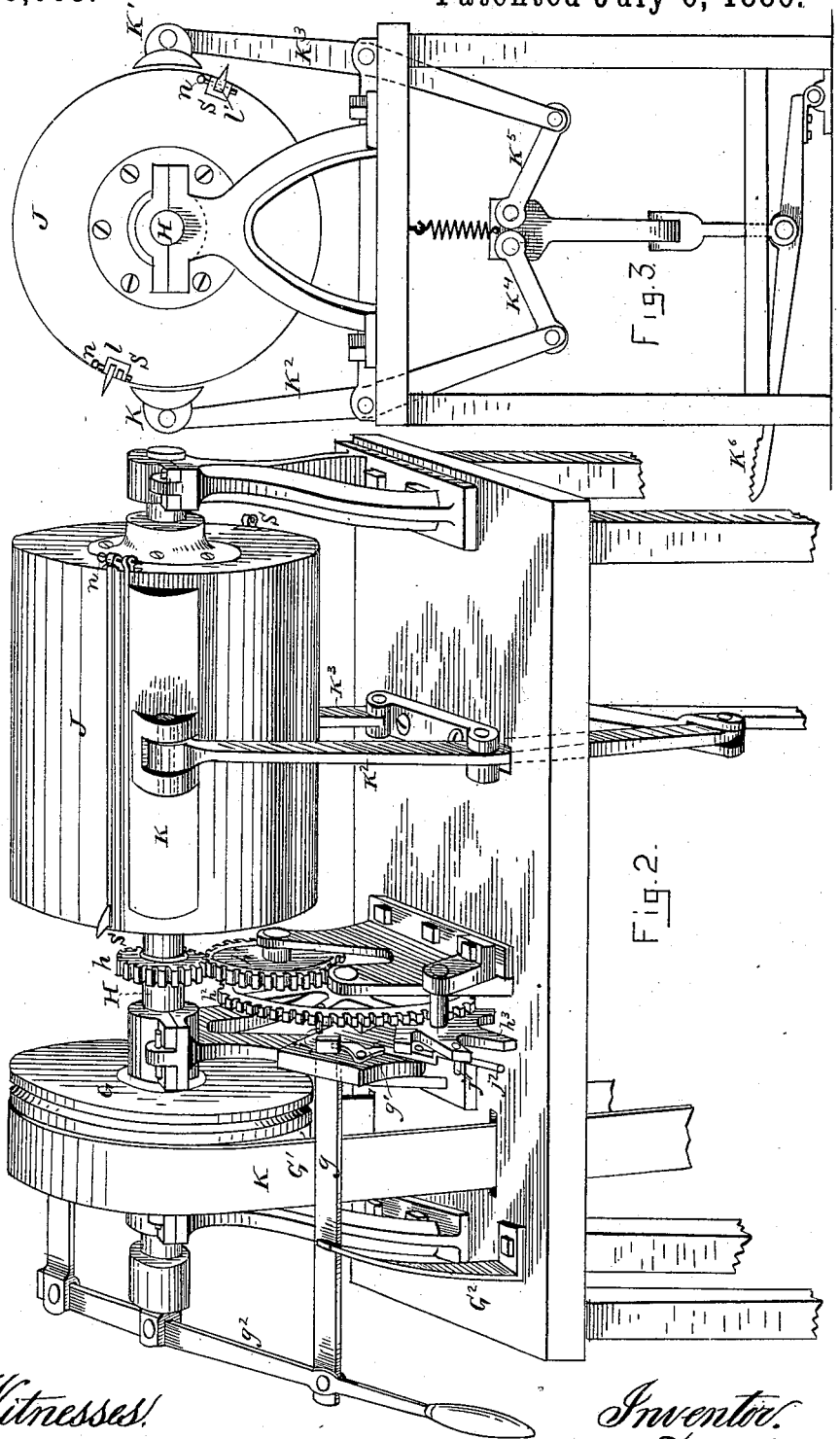

Fig. 3.

Fig. 2.

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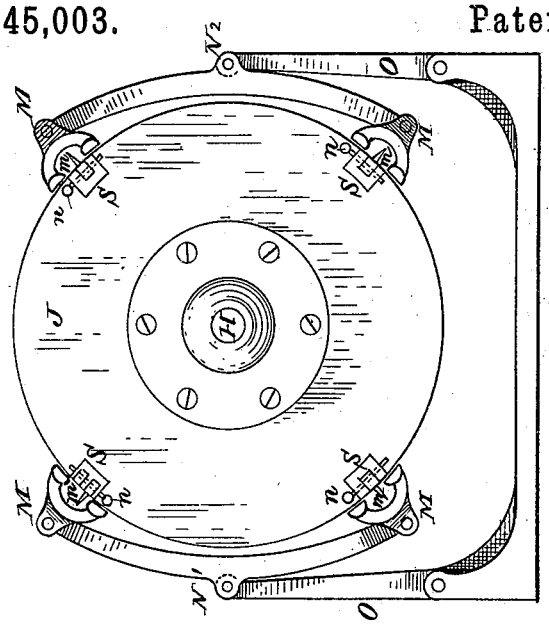

Fig. 5.

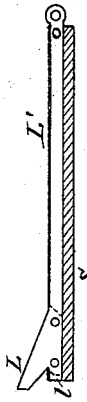

Fig. 7.

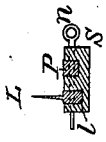

Fig. 6.

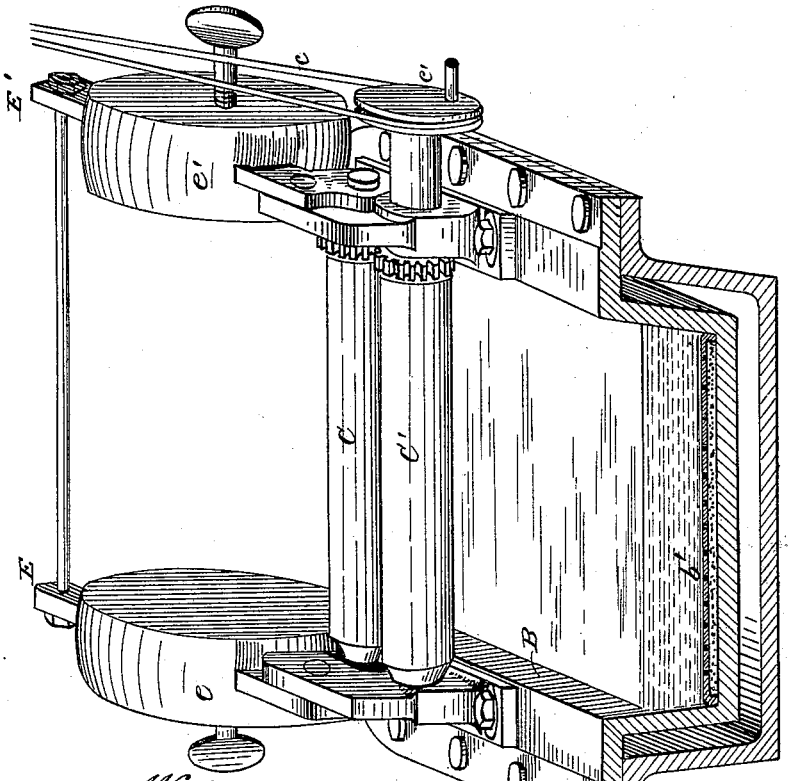

Fig. 4.

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UNITED STATES PATENT OFFICE.

HENRY C. SPALDING, OF BOSTON, MASSACHUSETTS.

APPARATUS FOR WATERPROOFING PAPER, &c.

SPECIFICATION forming part of Letters Patent No. 345,003, dated July 6, 1886.

Application filed April 20, 1886. Serial No. 199,463. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. SPALDING, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Waterproofing Paper and other Fabrics, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

My invention is a machine for saturating a web of paper or any other fibrous substance with a waterproofing substance—such as paraffine, wax, or the like—and is an improvement on the apparatus shown and described in my application filed October 23, 1885, No. 180,778.

The general object of the present invention is the construction of a machine or combination of co-operating mechanisms which when in action or operation will unwind a web or roll of any fabric—such as paper—carry it through a bath of melted wax or paraffine, remove the surplus waterproofing compound, cool that retained by the fabric, rewind the web, count or register the number of turns or convolutions, and cut the web into sheets of the desired size. My object is further to effect these several steps by a connected series of operations, all of which may be automatic. In practice, however, I find it most convenient to cut the paper by a suitable form of knife or cutter operated manually, but to provide automatic mechanism for performing all the other operations or steps in the treatment of the material.

The general nature of the apparatus embodying my invention is as follows: The paper, or whatever material is to be saturated with a waterproofing compound, is carried from a roll into a tank or bath of melted paraffine. Here it takes up a certain quantity of the hot fluid, and it then passes between two or more squeezing rolls or wringers, by means of which the excess of the compound is removed. It is then carried over guide-rolls to the winding mechanism, cool air being directed against each side of the web, for the purpose of cooling the waterproofing material before it reaches the winding-roll. The winding-roll is driven by a loose pulley and friction-clutch of any proper kind. A train of reducing-gears is operated by the winding drum or shaft, the last member of said train being arranged to make one revolution for, say, three hundred or four hundred revolutions of the winding-drum, and provided with a pin or some equivalent therefor, which at the end of each revolution releases the friction-clutch and stops the movement of the web. Clamping devices are provided which are then brought to bear upon the paper on the drum, and by suitable cutters or knives the roll is then divided at two or more points, thus cutting the web up into sheets. This mechanism involves, further, several mechanical details, among which are the means for regulating the pressure of the wringer-rollers upon each other, a device for regulating the tension of the paper web to compensate for varying rates of speed or progression, the appliances for dividing or cutting the roll to form separate sheets, and other details, the nature of which will be more full described by reference to the accompanying drawings.

Figure 1 is a general view in perspective of the apparatus complete. Fig. 2 is a perspective of the winding mechanism and parts connected therewith. Fig. 3 is an end elevation of the same. Fig. 4 is a perspective and part sectional view of the tank or bath. Fig. 5 is an end view of the winding-drum, showing a modified form of cutting and clamping mechanism. Fig. 6 is a section detail of the cutting mechanism. Fig. 7 is a side view of the same in detail.

The fabric is wound on a rod, *a*, in a roll, A, the rod *a* having its bearings in standards *a'*. Beneath the roll A is a pivoted lever, a^2, which acts as a brake upon the roll A, preventing it from turning too freely. The pressure of the brake is regulated by an adjustable or removable weight, a^3.

The fabric first passes over a deflecting-roller, *b*, and is carried down into the tank B, where it passes under a roller placed near the bottom of the tank in the usual way. On leaving the tank the web passes between two squeezing or wringer rollers, C C', which remove the surplus waterproofing compound taken up by the web. Thence the web passes

over suitable guide-rollers to the winding-drum, being cooled in its passage by air-blasts from two or more nozzles, T U V.

The tank B is formed with a steam-jacket, in which a sufficient steam-pressure is maintained to keep the contents of the tank hot and in a fluid state. The tank has also a removable perforated false bottom, b', through which the sediment and any water that may be present passes, so as not to come in contact with the web. The bottom may be taken out from time to time to remove the sediment or water.

The wringer-rollers are geared together so as to have the same rate of speed, and are made tubular and of metal, so that the heat of the web and the waterproofing compound adhering thereto will keep them hot. The shaft of one of these rollers—such as C′—extends through slots in the standards B′, and is journaled in the ends of a pivoted frame, E E′, carrying adjustable weights e e', the positions of which determine the pressure of one roller upon the other. Motion is imparted to these rollers by the conjoint effect of the traction of the web and the belt or cord c, which passes around a pulley, c', on the end of roller C′ and transmits motion from a pulley, C^2. As the paper or other fabric is wound upon a cylinder or drum that revolves at a uniform rate of speed, it is obvious that a variable speed of progression will in consequence be imparted to it; otherwise the very thin webs of paper often required could not be wound properly on account of its slight tensile strength. On the other hand, if no pull be imparted to the paper by the rewinding, it would not be laid smoothly upon the winding-drum. The belt or cord c is therefore arranged to have only so much traction on the pulley C^2 as will suffice to compensate for the weakness or want of tensile strength of a given quality of paper. Thus a belt-speed is maintained equal to or greater than the highest that would be required to move the paper at its maximum rate of speed, and the belt or cord is permitted to slip sufficiently to accommodate the pulley-speed to the rate of progression of the paper as it is wound around the drum or cylinder.

In order to secure the requisite tension of the belt or cord c, I pass it over the idler C′, carried by a pivoted frame or lever, d, which is provided with an adjustable weight, d'. Motion is imparted to the pulley C^2 by a belt, c'' c'', passing over an intermediate pulley, F, which latter is driven by a belt, f, from a member of the winding mechanism.

The winding mechanism is shown in detail in Fig. 2. H is a shaft in suitable bearings, carrying the winding-drum J and a fixed pulley, G. Alongside of the latter pulley is a loose pulley, G′, which is driven by a belt, K, from any convenient source of power. A common form of hand-clutch lever, g^2, is used to force the pulley G′ into frictional engagement with the pulley G. A bar, g, is connected to lever g^2, and passes through one of the standards or other fixed support. A catch, g', is pivoted to the side of the standard and engages with the bar g, holding the two pulleys in contact. A train of reducing-gears, h h' h^2, is driven by the shaft H. The gear-wheel h^2 carries a pin, j, that turns a star-wheel, h^3, one step or tooth at each complete revolution of the wheel h^2. The star-wheel h^3 carries a pin, j', that comes in contact with a tripping-lever, j^2, once in every turn of the wheel h^3, and by so doing trips the catch g' and releases the clutch g^2, thus stopping the winding-drum. A convenient arrangement of these devices is to have the pin j on wheel h^2 move the star-wheel h^3 forward one tooth at each forty revolutions of the winding-drum. If the wheel h^3 has ten teeth, the winding-drum will be stopped after four hundred layers have been wound upon it. By using more than one pin on wheel h^2 this number will be reduced as may be desired. When the drum S is stopped, pressure is applied to the treadle K^6, which brings the clamps K K′ firmly against the material on the drum, the clamps being carried by the levers K^2 K^3, which are operated by the toggles K^4 K^5.

At one or more points on the drum is a sliding cutter, l, which is drawn through the paper near the edge of the clamp, severing it into sheets. Of these knives or cutters one, two, four, or other number may be used. The preferred construction is shown in Fig. 7. L′ is a metal bar or blade that fits in a recess or groove in the winding-drum. At one end it is provided with a ring or hook, by means of which it is drawn along the groove, and at the other end it carries a steel blade, L, which may be taken off and sharpened or replaced by another. One or more pins, n, are used to hold the cutters L and bars L′ in the grooves when not in use; or any other equivalent devices may be used for this purpose. Parallel with one of the cutters is a bar, P, that fits down into a groove in the drum, and that is held therein by the same means as the bars L′. The bar P is for the purpose of holding the edge of the web when it is first wound upon the drum.

I may vary the form of clamp—for example, as is shown in Fig. 5. In this case four clamps, M, are carried by two arms, N′ N^2, pivoted to the levers O O′, corresponding to levers K^2 K^3 in Fig. 3. The clamps M have a groove or channel running along their entire length, and the cutters M are so placed that they may be drawn through the paper underneath the clamps and in the aforesaid channels.

I prefer to use channeled bars S for the cutters and bar P, which bars are independent of the drum J, and are set in the same at the desired points.

What I claim is—

1. The combination, with an apparatus for saturating a web of paper or other fabric with a waterproofing compound, of a winding-drum, a registering or counting mechanism operated thereby, and a stop mechanism controlled or adapted to be brought into operation by the

counting mechanism for arresting the movement of the winding-drum after a given number of revolutions, as set forth.

2. The combination, with an apparatus for saturating a web of paper with a waterproofing compound, of a winding-drum, a registering or counting mechanism operated thereby, a stop mechanism controlled by the counting-mechanism, and cutters or knives arranged in the winding-drum for severing the web into sheets, as set forth.

3. The combination, with an apparatus for waxing paper, of a winding-drum, a registering or counting mechanism operated thereby, a stop mechanism controlled by the counting mechanism, one or more clamps adapted to be brought against the material on the drum in lines parallel with the axis, and cutters or knives adapted to be drawn through the paper on the drum near the clamps, as herein described.

4. The combination, with mechanism for unwinding a web of paper or similar fabric, saturating it with a waterproofing compound and rewinding it, of mechanism for securing the proper tension of the web at all times during the above-described operations, the same consisting of pressure or wringer rollers through which the web passes, and a loose driving-belt therefor of variable or adjustable tension, having a normal rate of speed equal to or greater than that required for the highest rate of speed or progression of the web, as herein set forth.

5. The combination, with means for passing a web of paper through a tank or bath of insulating material, of wringer or pressure rolls, one in stationary bearings, the other carried by a pivoted and adjustably-weighted frame, gears connecting the two rolls, and a belt for imparting motion to one of them, as and for the purpose set forth.

6. In an apparatus of the kind described, the combination, with a pair of pressure or wringer rolls geared together and adjustable with respect to each other, of a driving belt and pulley on one of said rolls, a pulley carried by a pivoted and weighted lever for imparting motion to the belt and itself driven by a suitable source of power, all as and for the purpose set forth.

7. The combination, with the winding-drum of a paper-waxing machine, of clamps adapted to bear upon the drum in lines parallel with the axis, and cutters or knives set in grooves in the drum and adapted to be drawn through the paper when wound thereon, so as to cut the same into sheets, as described.

8. The combination, with the tank of a paper-waxing machine, of a removable perforated false bottom, as set forth.

HENRY C. SPALDING.

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FRED. J. WOOD.