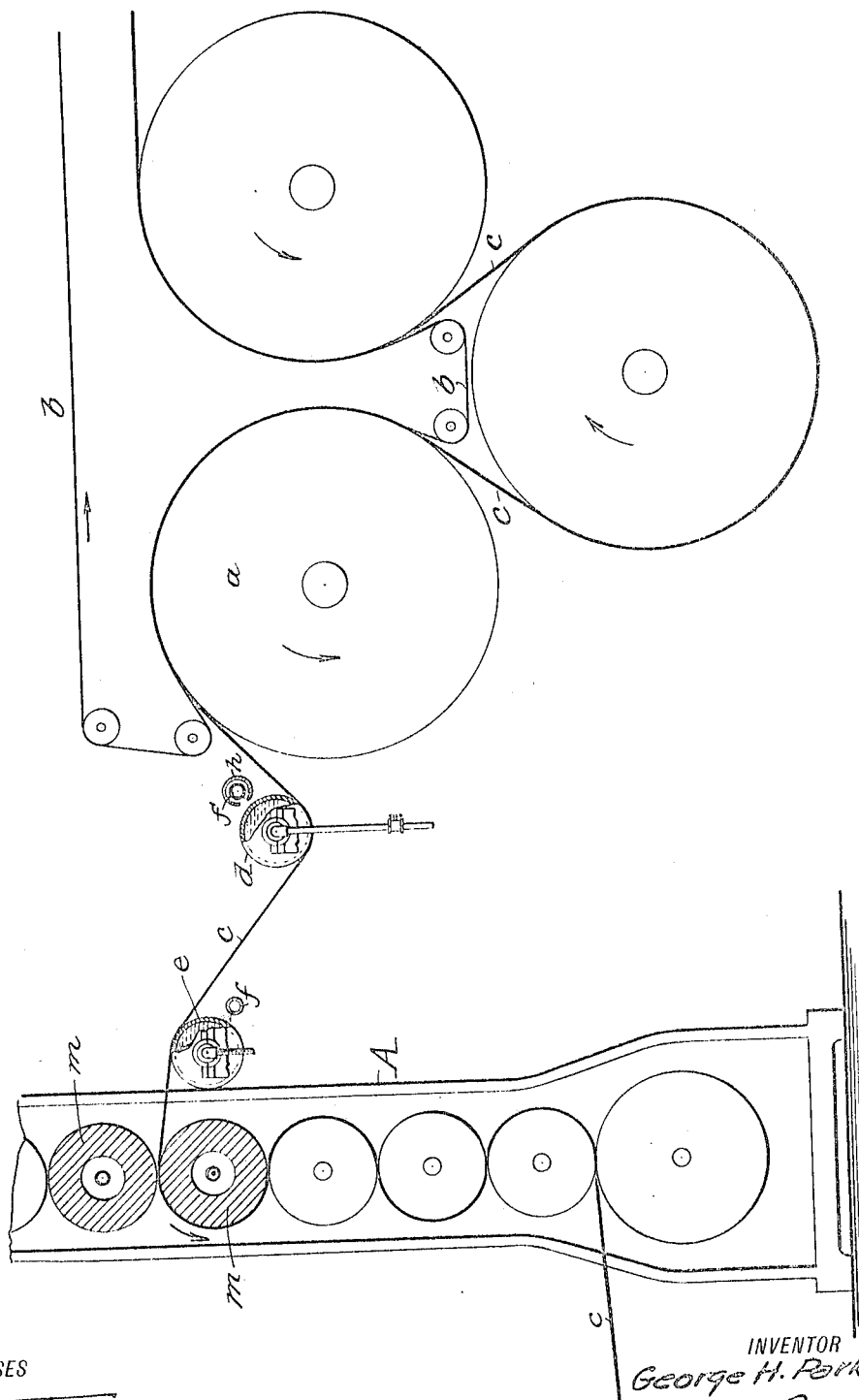


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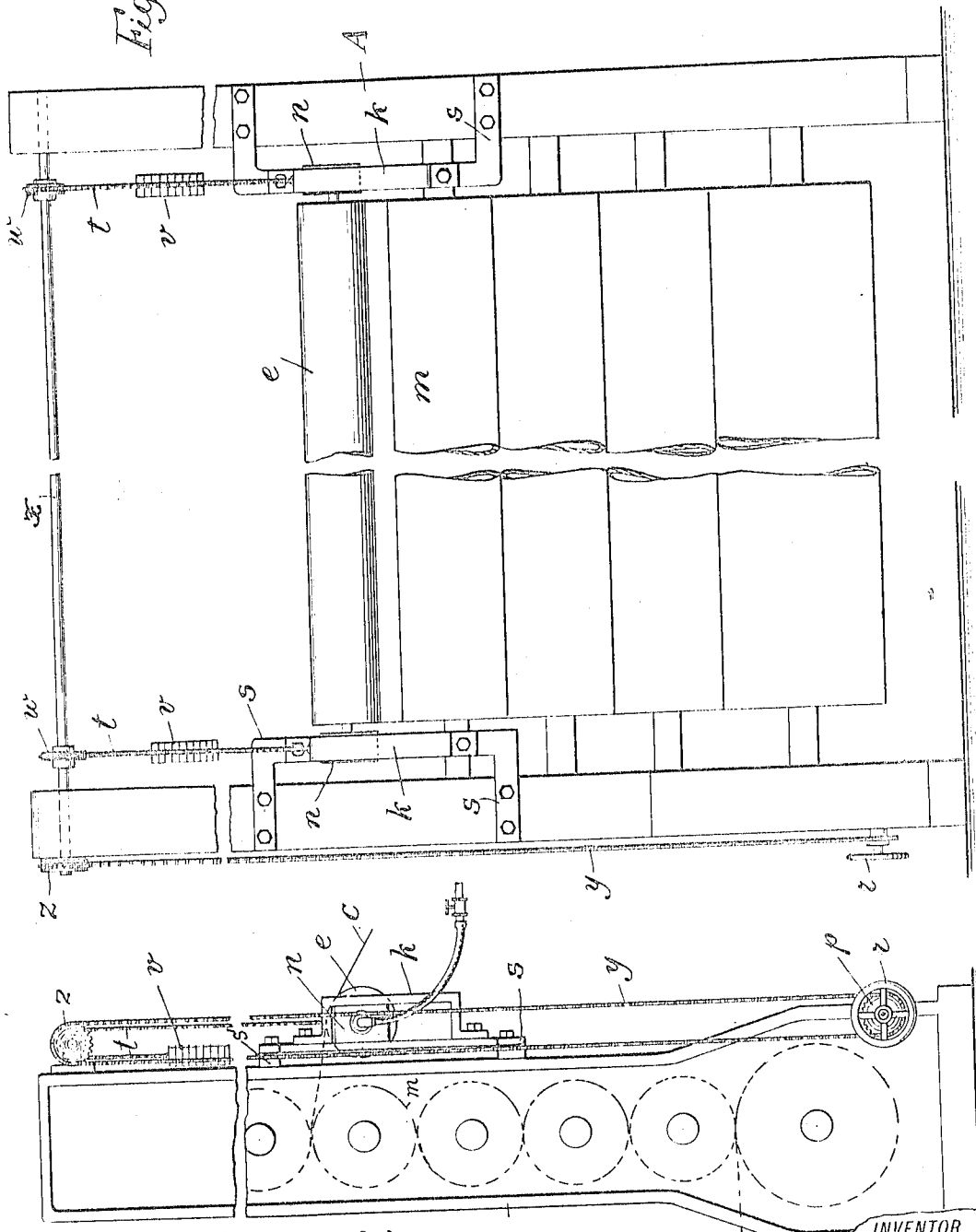
Fig. 1,



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Fig. 2.

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UNITED STATES PATENT OFFICE.

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SURFACING PAPER.

1,291,626.

Specification of Letters Patent.

Patented Jan. 14, 1919.

Application filed March 9, 1914. Serial No. 823,359.

To all whom it may concern:

Be it known that I, GEORGE H. PARKS, a citizen of the United States, residing at and whose post-office address is Glens Falls, county of Warren, State of New York, have invented certain new and useful Improvements in Surfacing Paper; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to certain new and useful improvements in imparting to the surface of paper a uniform soft glaze or finish, preferably on both sides of the sheet, for the purpose of improving its appearance and resistivity to wear and tear, and, in the case of printing paper, to facilitate its running through the press and the elimination of the difficulty known in the art as "fluffing" of the paper surface. So also, the treatment incident to the practice of the invention, permits the paper upon reaching the calender from the paper machine to calender more uniformly and with less liability to wrinkling or cockling as it passes through the calender stack, and with the generation of less frictional electricity than is usually produced at the stack. Moreover, in practice, it is found that the snapping off of the paper at the stack, and the production of hard and soft streaks in the rolled paper are of less frequent occurrence, and that, with the employment of the steam heated calender rolls in the relationship hereinafter set forth, the paper possesses more stretch than the customary product,—the invention permitting the paper to be effectively calendered at a pressure less than ordinarily used on a calender stack.

In the accompanying drawings,—

Figure 1 represents, in part diagrammatically a suitable arrangement for putting the invention into practice;

Fig. 2 represents an end elevation of a calender stack, partly broken away, provided with a shiftable roller, constituting one of the elements of the invention; and

Fig. 3 represents, partly broken away, a side elevation of the calender and shiftable roller shown in Fig. 2.

For purposes of illustration, the paper machine is shown of the type wherein the sheet is delivered from one of the top rolls *a* of the series. This is preferred, in practice,

but it will, of course, be understood that the paper sheet or web may be delivered from any other roll of the paper machine, according to the particular type of paper machine employed. *b* indicates the customary canvas web of the paper machine.

On leaving the drier roll *a* of the paper machine, the paper web, which is indicated by *c* in the drawing is at a temperature of from 160° Fahr. to 200° Fahr. In passing to the rolls of the calender *A*, the web is carried over one and under the other of two rollers *d, e*, which come in contact, respectively, with opposite sides of the paper on its way to the calender stack. The rollers *d, e*, are water-cooled, and, for this purpose may conveniently consist of a cylindrical shell of say one-quarter of an inch in thickness and closed ends provided with hollow trunnions, through which a continuous stream of cooling water is passed. The temperature of the water is such as to cause a deposit of moisture upon the surface of the rollers *d, e*, from any source of moisture that may be provided, adequate for the purpose. Thus, for uniformity and regularity of deposit of the moisture upon the calender surface of the roll, it will be suitable and preferable to locate alongside of each of the rollers *d, e*, a pipe *f*, supplying through a longitudinal slot a body of steam of low pressure and temperature, or a body of moisture-laden air, so that on coming in contact with the periphery of the rollers, moisture will be deposited thereon.

In order to prevent dripping from that one of the steam pipes which is located above the web of paper *c*, it may be inclosed within a suitable outer pipe *h*, whose function is to convey any such dripping to a suitable point of discharge. This outer pipe will, in general, not be necessary for the steam pipe below the paper web *c* for the reason that any dripping from that steam pipe would fall clear of the paper. Both of the rollers *d, e*, are idlers, and the roller *d*, may be the usual "spring roll" familiar to the paper machine art, and will have for its function to keep the paper web at the proper tension and to deliver it uniformly and without wrinkles to the calender.

The bearings for the roller *e* may be either stationary, as assumed in Fig. 1, or may be shiftable, as shown in Figs. 2 and 3. They are preferably shiftable, as shown in said

Figs. 2 and 3, so as to enable the operator to move the roller away from its normal position into a position where it will be out of the way whenever it is desired to enter the paper web *c* into the pass of the steam heated rolls *m* either initially, or at any other later stage in the operation. Thus, should the paper web break, which is a not unusual occurrence in the making and calendering of paper, it is customary for the operator to seize the broken end of the web, in the space between the paper machine and the calender stack and to quickly throw said end into the appropriate pass of the calender rolls, and the roller *e* is made shiftable in order that it may not interfere with this operation, or with the like operation when the end of the paper web is introduced into the calender rolls when the paper is first delivered from the paper-making machine.

A suitable arrangement for shifting the roller *e* may consist, for instance, as shown in Figs. 2 and 3, in shifting it downwardly. To this end, the bearings *n* for the roller *e* are held firmly between the straps *k* and *s*; strap *s* having two wooden blocks *s'* bolted to same at the ends, which slide freely up and down on the sides of the calender frames. These shiftable straps are connected by sprocket chains *t* to counter-weights *v*. The sprocket chains *t* engage with sprocket wheels *w* on the shaft *x*, and the shaft *x* is provided with a sprocket wheel *z* operated by a sprocket chain *y*, which engages a sprocket wheel *p* mounted upon a stub shaft, which carries a turn-wheel *r* within easy access by the operator; so that, by means of the turn-wheel *r*, he may lower the roller *e* out of the way, when desired.

The paper, in practice, usually leaves the roller *d* at a temperature of about 100° Fahr., and passes the roller *e* at about the same temperature, this temperature being sometimes raised slightly by the accumulation of steam in the angle between the periphery of the roller *e* and the underside of the paper. The moisture which has been deposited on the periphery of the rollers *d*, *e*, is carried, by the revolution of said rollers into contact with the opposite sides or faces of the paper web, and is applied thereto with relatively light pressure,—that is to say, with the light pressure of the spring roll *d*, and with the like pressure due to the change of angle of the paper web in passing over the roller *e*. The paper web, traveling at the usual high rate of speed, say from 500 to 600 ft. per minute, traverses the space between the roller *d* and the calender stack, which space is on the average about 8 to 10 feet, in a correspondingly brief interval of time, and at once enters the calender, as indicated, finally issuing from the lower pass thereof. The rolls *m*, *m* of the calender are hollow and are steam heated, to a temperature of about

200° F. They constitute, in substance, heated ironing rolls for the surface-dampened paper web and the finished paper finally issues from the lowermost pass of the calender stack, with the uniform soft surface finish desired. The remaining rolls of the calender stack other than the rolls *m* are of the usual solid construction customary in paper mill calenders, and may be of any suitable number and size appropriate to the kind and quality of stock treated, as, for instance, newspaper stock, manila stock, or the like.

The paper stock will contain the customary amount of sizing. The amount of moisture collected upon the rollers *d*, *e*, and applied to the paper will be sufficiently moderate to produce, in conjunction with the sizing, the skin finish contemplated, without weakening the paper web, and the ironing effect due to the action of the heated rolls *m*, will so far strengthen the paper that a notably less amount of pressure will be necessary in the calender stack than that usually employed.

In so far as I am aware, it is broadly new in the manufacture of paper, to impart a soft glaze thereto, by moistening the paper surface, as described, and then subjecting the paper surface to the action of heated rollers, which exercise an ironing effect upon it, in conjunction with a calendering action. In some instances, according to the type of paper machine employed, that is to say, according to whether the web is delivered to the calender stack from a lower roll of the paper-making machine or from an upper roll thereof, the said upper roll or the said lower roll, as the case may be may itself be cooled by water, or otherwise, and used, in conjunction with a steam spray, to receive a precipitation of moisture upon its surface and to apply the moisture to the corresponding surface of the paper web, in manner similar to that of the roller *d* or the roller *e*.

So also it will be understood that the use of the invention is not limited to the locating of the rollers *d*, *e*, between the paper machine and the calender stack. Thus, they may be located, for instance, in the space between the paper reel and a super-calender, plater, or other type of machine used for surfacing paper. Furthermore, one of the rollers *d*, *e*, may be used without the other, whenever, for any reason, it is considered desirable to provide but one surface of the paper web with the proposed finish.

The term "ironing", as employed herein, is intended to define the operation produced by the upper rolls of the calender stack, when heated to about 200° F.

Having thus described my invention, what I claim is:—

1. The method of imparting a soft surface glaze to a web of paper, on both sides

of said web, which consists in condensing moisture upon the periphery of a cooled roller, rolling said moisture with light tension-roll pressure into and upon one side of the paper web, condensing moisture upon the periphery of another roller and rolling said moisture with light tension-roll pressure into and upon the other surface of the paper at a point in advance of the first roller, ironing the moistened paper web at a temperature higher than that of its moistened surfaces, and finally calendering the web after such ironing.

2. Apparatus for imparting a soft surface gloss to a web of paper, comprising means for moistening the surface to be finished and a calender stack containing an upper pair of internally heated ironing rolls and a lower series of calender pressure rolls; substantially as described.

3. Apparatus for imparting a soft surface gloss to a web of paper, comprising a roller, means for cooling the periphery of the roller and for condensing moisture thereon, and a calender stack having an upper pair of internally heated ironing rolls and a lower series of pressure rolls; substantially as described.

4. Apparatus for imparting a soft surface gloss to paper, comprising a roller provided with means for cooling its periphery, means for supplying condensable moisture to said periphery, internally heated ironing rolls, calender pressure rolls, and means for conveying the paper web into contact with the periphery of the cooled roller and through the ironing rolls and calender pressure rolls; substantially as described.

5. Apparatus for imparting a soft surface gloss to paper, comprising two rollers, one of said rollers being located in advance of the other, and each of them being provided with means for cooling their peripheries and for condensing moisture thereon, inter-

nally heated ironing rolls, pressure calender rolls, and means for conveying the paper web into contact, on one side with one of the cooled rollers and on the other side into contact with the other of the cooled rollers, and thence through the ironing rolls and calender pressure rolls; substantially as described.

6. Apparatus for imparting a soft gloss to paper, comprising a roller provided with means for cooling its periphery, means for supplying condensable moisture to said periphery, and a calender stack containing ironing rolls and calender pressure rolls, the said cooled roller being shiftable to and from operative relationship to the paper web; substantially as described.

7. Apparatus for imparting a soft surface gloss to paper, comprising a roll provided with means for cooling its periphery, means for supplying condensable moisture to said periphery, and a calender stack provided with ironing rolls and calender pressure rolls, said cooled roller being mounted in bearings and shiftable up and down on the calender stack; substantially as described.

8. Apparatus for imparting a soft surface gloss to paper, comprising a roller provided with means for cooling its periphery, means for supplying condensable moisture to said periphery, and a calender stack, provided with ironing rolls and calender pressure rolls, the said cooled roller having bearings, movable up and down in front of the calender stack, counterweights for the bearings, and means for shifting the bearings in opposition to the counterweights; substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

GEORGE H. PARKS.

Witnesses:

CHESTER S. COLSON,
JAS. A. NEILL.