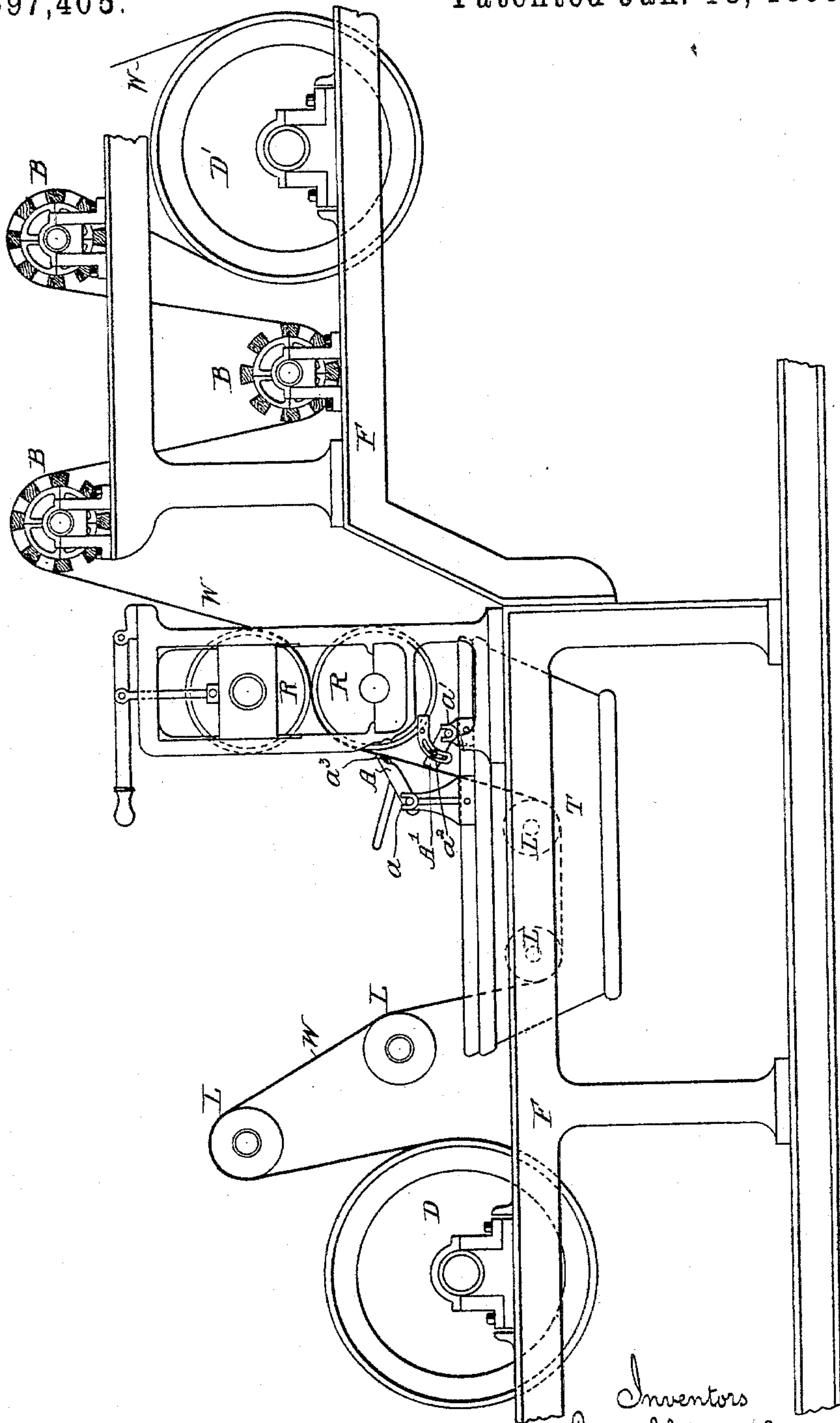


(No Model.)

G. W. A. FITZ GEORGE & H. J. BROWN.  
APPARATUS FOR ENAMELING PAPER.

No. 597,405.

Patented Jan. 18, 1898.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR ENAMELING PAPER.

SPECIFICATION forming part of Letters Patent No. 597,405, dated January 18, 1898.

Application filed June 15, 1896. Serial No. 595,660. (No model.) Patented in England October 16, 1895, No. 19,471; in Germany June 7, 1896, No. 92,166; in France June 22, 1896, No. 257,457; in Belgium June 22, 1896, No. 122,079; in Norway October 12, 1896, No. 5,466, and in Austria March 30, 1897, No. 47/1,088.

*To all whom it may concern:*

Be it known that we, GEORGE WILLIAM ADOLPHUS FITZ GEORGE, of 37 Queen Victoria Street, London, and HAWTHORN JAMES BROWN, of South Darenth, Kent county, England, subjects of the Queen of Great Britain and Ireland, have invented certain new and useful Improvements in Apparatus for Enameling Paper, of which the following is a specification.

The invention has been patented in Great Britain, No. 19,471, dated October 16, 1895; in Germany, No. 92,166, dated June 7, 1896; in France, No. 257,457, dated June 22, 1896; in Belgium, No. 122,079, dated June 22, 1896; in Norway, No. 5,466, dated October 12, 1896; and in Austria, No. 47/1,088, dated March 30, 1897.

Our invention relates to the manufacture of coated or enameled paper suitable for artistic printing; and it consists in a process whereby paper can be evenly and very efficiently coated or enameled on both sides simultaneously with the making of the paper, thus obviating the separate and costly process of coating or enameling the paper after it is made, as hitherto practiced.

By our invention we overcome a difficulty which, so far as we know, has heretofore always proved insuperable—viz., the even application to and distribution upon the web while in a more or less damp state of the coating solution, which is necessarily of high specific gravity or density, thick consistency, and sticky nature, for which reasons it requires special appliances to insure its efficient and even application to and without injuring the web.

According to our invention a tank containing coating solution of suitable density is placed about the middle of the group of drying-cylinders of the ordinary paper-making machine. When the continuous web reaches this point, it is intercepted on the drying-cylinders, which are equipped with the usual drying-felts, and passed through the coating solution contained in a tank; thence it passes upwardly between a pair of specially-con-

structed radial motion-adjustable scrapers, hereinafter termed "adjusters," for surface leveling and taking off the superfluous coating; next between a pair of felt-covered squeezing-rolls; then, if necessary, over open-sparred drying-drums to the remaining ordinary drying-cylinders and along the machine in the ordinary course. Thus the finished product is a paper evenly enameled on both sides and of unimpaired strength.

The annexed drawing represents in side elevation the middle part of the group of drying-cylinders of a paper-making machine having our invention applied thereto. The drying-cylinders of the machine are spaced apart, preferably about the mid-length of the group, so as to have about an equal number at either side of a gap sufficiently long to admit of the introduction of our apparatus.

D represents the last drying-cylinder of one part of the set, and D' the first of the other part of the set, all being mounted in the usual manner on the frame F.

T is the tank containing the coating solution fixed to the machine-frame F, through which solution the continuous web of paper W is passed from D to D' over and under suitable leading-rolls, such as L L. The solution may be of any usual or preferred composition—such as blanc fixe, china-clay, calcium sulfate, or mixtures thereof with appropriate "fixing"—and its specific gravity may vary between 1.100 and 1.250 (or 20° to 50° Twaddell's hydrometer,) according to circumstances. The specific gravity of any enameling solution is, however, much higher than that of the solutions used in the known processes of tub-sizing, hard sizing, and the like, and hence great care is essential in using same. After having been thus passed through the coating solution in the tank T and being completely and thickly covered therewith the web passes first between a pair of adjusters A A'—one above and the other below the coated web. These scrapers extend transversely across the full width of the web, and their axes are pivoted to bearings *a a'* on the tank T, so as to afford a radial movement.



The upper one, A, is self-acting and the lower one, A', when adjusted is provided with means for fixing it, and the pressure best suited for removing superfluous coating and evenly distributing the rest is adjusted by suitably-disposed set-screws, such as  $a^2$ , so that the action is automatic. It is advantageous to make the nose part of each adjuster in contact with the web W of hard smooth wood appropriately curved and shaped, so as not to injure the web. They may be wholly of wood, or the wooden nose-piece may be carried in a brass or metal frame fixed to the axis.

It is advantageous to use with the upper adjuster A a transverse apron or auxiliary scraper or leveler disposed as at  $a^3$ , made of stout moleskin, sheet-rubber, or the like, to assist in keeping back superfluous coating on the upper side. After passing between the scrapers the web is guided between squeezing-rolls R R, which are covered with felt or other soft material. These rolls serve to impress the coating left by the scrapers and to incorporate same with the web. They are adapted for adjustable pressure, as illustrated, or otherwise suitably.

The use of the self-adjusting adjusters and covered squeezing-rolls is an essential feature in our invention, as by their mutual action the thick and sticky coating this invention enables us to employ is adjusted to the required thickness and rendered perfectly even and regular all over the surfaces of the web. In cases in which, owing to the extra thickness or stickiness of the coating, there would be a risk of its adhering to the succeeding drying-cylinder D' the coated web is passed from the rolls over open drums B B B before passing on to the said drying-cylinder D'.

The open-work drums (shown at B) are ordinary sparred drums, allowing of free contact of air with the web; but, as stated, they are not essential to the performance of our process; but if not used, it will be necessary to use two or more cylinders without drying-felts—that is, bare or jacketed—as may be required. The paper web thus thoroughly coated on both sides proceeds through the rest of the drying-cylinders beyond D' and is

smoothed, calendered, and reeled in the usual manner.

By the above-described process of manufacture the following advantages accrue: The paper is made, coated or enameled, and dried at one and the same time, and thereby great economy in time and labor is effected, since coating or enameling of each side and drying hitherto required to be performed at separate times and on separate machines subsequently to the manufacture, are saved; also, the paper is perfectly evenly coated and takes a high finish and is well adapted for high-class illustrations, &c. Further, paper made according to our improved process not being subjected to any subsequent wetting and drying operations is stronger and better adapted for binding, &c., since the strength of the fibers is better maintained. It is obvious that by keeping the level of the solution in the tank at the same level as the web one side only of the paper can be coated, and this is useful in cases where, for example, duplex color is required.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

An apparatus for enameling paper as it is made consisting of the combination of a tub with means for directing the paper from the paper-machine to and through the enameling solution in the tub, the upper and lower adjusters or surface-levelers receiving the paper immediately after leaving the tub for distributing the material perfectly on each side of the paper, the upper one of said adjusters being pivotally supported and automatically and radially adjustable; the squeezing-rolls for receiving the paper immediately after leaving the adjusters and means for finally receiving the paper, substantially as described.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

GEORGE W. A. FITZ GEORGE.

HAWTHORN J. BROWN.

Witnesses:

HENRY A. PRYOR,

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