No. 744,422. Patented November 17, 1903.

UNITED STATES PATENT OFFICE.

ROGER D. SMITH, OF DEDHAM, MASSACHUSETTS, AND HUGH A. CRAIGIE AND WILLIAM H. HOLSTON, OF CUMBERLAND MILLS, MAINE.

MANUFACTURE OF PAPER.

SPECIFICATION forming part of Letters Patent No. 744,422, dated November 17, 1903.

Application filed January 23, 1903. Serial No. 140,313. (No specimens.)

To all whom it may concern:

Be it known that we, ROGER D. SMITH, a resident of Dedham, county of Norfolk, and State of Massachusetts, and HUGH A. CRAIGIE and WILLIAM H. HOLSTON, both residents of Cumberland Mills, in the county of Cumberland and State of Maine, citizens of the United States, have invented new and useful Improvements in the Manufacture of Paper, of which the following is a specification.

Our invention consists in a new and improved method of making paper especially adapted for use in making process or half-tone prints or cuts and in the product of this method—to wit, the paper which results from the application of our new process.

Printers of magazines, illustrated books, catalogues, and the like demand for use in making process or half-tone cuts or prints a coated paper which shall possess an even surface free from roughness or irregularity of any sort which may interfere with the reception of prints from the shallow plates employed in half-tone and other modern processes. Paper manufacturers have heretofore furnished for this purpose a grade of paper known as "coated book" or sometimes as "fine cut-paper," so called because adapted to the production of fine cuts or prints, which so far as smoothness and evenness of surface is concerned meets the trade requirement; but the processes of manufacturing such paper, which have heretofore been regarded as indispensable to its production, have involved a final finishing or calendering of the paper, which leaves its surface hard, glazed, non-absorptive, and highly light-reflecting. This highly-polished light-reflecting paper has been accepted and used by the printers, because it has been the only paper produced which possesses the requisite evenness for half-tone printing; but this glazed light-reflecting paper has its disadvantages. It is incapable of yielding the soft and pleasing effects in a print which are peculiar to an unpolished or "dead" smooth surface, and in printing solid or dark masses of shade or color on the glazed fine cut-paper great care has to be exercised lest too much ink remains on the surface. The polished paper resists absorption of ink and will not hold the ink well enough to permit the application of as solid a color or shadow as the artistic printer desires without being liable to produce "offsets"—that is to say, transfers of surplus unabsorbed ink from the print to the opposite page of the book or to the tissue leaf sometimes interposed for protection. The printer is obliged to sacrifice part of the desired artistic effect and cannot obtain a good solid color. Critical examination of prints made on this glazed paper will detect the imperfect and streaky appearance of the more solid portions. Therefore and until the application of our new process to the manufacture of cut-paper the printers and publishers have been obliged to suffer the above-mentioned imperfections to pass in order to avail themselves of the indispensable smooth and even finish of the highly-polished paper. By the employment of our new process herein to be described the publisher can be supplied with a fine cut-paper which possesses to a perfect degree the smoothness of surface which is demanded for process-prints and which also, unlike the paper heretofore furnished for the purpose, has a dead finish, which lends itself to the production of the most pleasing artistic effects and on which solid colors or shades can be perfectly printed with substantially no danger of offsets.

Heretofore magazines and books have frequently been made up of two qualities of paper, the polished and light-reflecting fine cut-paper for those portions of the book which contain the process-prints and a non-reflecting dead-finished paper suitable to the printed text. Sometimes the entire book is printed on polished fine cut-paper for the sake of uniformity, and in most cases the fine cut-paper has been used both for process-prints and the adjoining printed text. It is disagreeable to the eye to read from print on such polished paper, because there is usually a broad band of reflected light on some portion of the page. When the book is made up of two grades of paper, the resultant appearance of the book is unsatisfactory. In contrast to this a book or magazine made entirely from our new fine cut-paper is uniform in appearance and the printed pages are agreeable to the eye, or if the book be made

only partly of our new paper the contrast between it and the ordinary dead-finished text-paper is not nearly so great as in the instances heretofore noticed. The contrast between the process-prints made on paper prepared by our new process and those made on the old polished paper is very much like that between the modern platinum-printed photograph and the old-fashioned highly-glazed photographic portrait.

In carrying forward our new process we take the desired grade of paper, which may or may not have been supplied with a filler during its manufacture in the paper-machine, and before coating it in any way subject it to a high-pressure calendering, which compacts the paper-body and gives it a smooth even surface. Calendering such as that known as "supercalendering" will produce the desired preparatory condition. The best results are obtained by passing the paper through a set of rolls under heavy pressure in such manner that with the pressure there is some rubbing of the rolls upon the paper. This step in our process yields an uncoated paper which is rolled or rubbed or rolled and rubbed to a smooth surface somewhat polished and light-reflecting and which is in condition to receive a coat of glue size, albumen, or other adhesive vehicle for the clay, blanc-fixe, or other suitable filler. The application of such a coating has heretofore in the manufacture of fine cut-paper been preparatory to the final calendering, which produced the glaze or polish which our process wholly avoids. In our process the coating of, say, glue size and clay is the final step and is applied after the paper has been compacted and smoothed, as by calendering. The coating, however, should not be so heavy with paper prepared by our process as with paper prepared in the old way, which called for a final calendering. We have found that a coating about half as heavy as that employed in the old process of making fine cut paper yields good results, while if our paper is coated as heavily as the old style the coat is liable to form a cake on the surface of the paper. The application of the coating to our paper swells or plumps the paper-body a little, but not enough to impair its perfect receptivity to process-prints. This swelling or stuffing of the paper of the paper-body renders it faintly absorptive, so that the heaviest shades of ink can be evenly printed thereon with but little danger of offsets. The paper thus prepared is lighter for its bulk than the old style of fine cut-paper, a quality which still further renders it valuable to the publisher. After our paper, which has been, as above described, calendered and then coated, is dry it is ready for the market.

What we claim, and desire to secure by Letters Patent, is—

1. The method of producing dead-finished fine cut-paper, which consists in compacting and evening the surface of paper as by calendering and thereafter coating the paper with a size and filler, such as clay, blanc-fixe, or the like.

2. The method of producing dead-finished fine cut-paper, which consists in compacting and evening the surface of paper as by calendering and thereafter coating the paper with a size and filler of about half the weight of a coating suitable for coated paper which is to receive a final calendering.

3. Dead-finished fine cut-paper, having an uncalendered coating such as a size, and filler of clay, blanc-fixe, or the like, upon a surface compacted and evened as by calendering.

4. Dead-finished fine cut-paper, having upon a surface compacted and evened as by calendering, an uncalendered coating of about half the weight of a coating suitable for fine cut-paper which is to receive a final calendering after having been coated.

Signed by me at Boston, Suffolk county, Massachusetts, this 10th day of January, 1903.

ROGER D. SMITH.

Witnesses:
FRANK S. HARTNETT,
JOSEPH T. BRENNAN.

Signed by us at Cumberland Mills this 14th day of January, 1903.

HUGH A. CRAIGIE.
WILLIAM H. HOLSTON.

Witnesses:
JAMES H. TOLMAN,
FRANK S. HARTNETT.