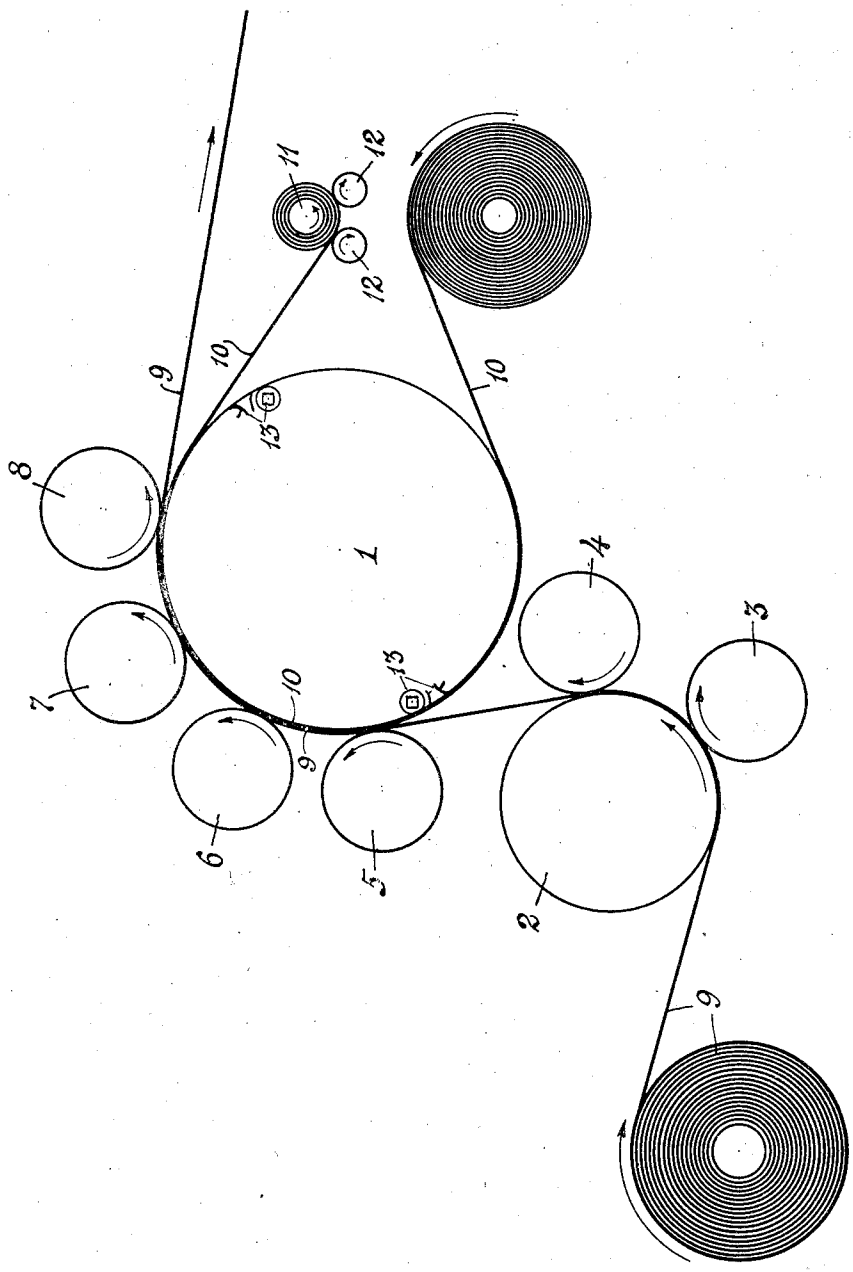
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MACHINE PRINTING ART

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WITNESS

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# UNITED STATES PATENT OFFICE

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## MACHINE-PRINTING ART

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This invention relates to improvements in the machine printing art as exemplified by the use of presses known in the trade as perfecting presses wherein the printed matter is first applied to one side of the sheet to be printed and said sheet is thereupon, with its printed surface placed against an impression resisting cylinder or element, subjected to a printing operation on its opposite surface. In such a procedure the ink deposited by the first printing operation will smudge as it passes over the pressure resisting element and the invention more particularly relates to the protection which must be afforded against smudging during this stage of the operations. The object of the invention is to conduct the operation of printing in connection with a perfecting press in such a way that as the printed matter passes over the impression resisting element smudging of the printed matter and off-setting of the ink is minimized.

A press typical of a perfecting press is illustrated in the accompanying drawing which represents diagrammatically the printing process conducted in accordance with one method of carrying out my invention.

In this drawing 1 represents the impression resisting element or impression cylinder; 2 represents an antecedent impression cylinder; 3 and 4 represent what is known as plate cylinders, the surface of which perform the act of printing. In many presses but one of such cylinders is used at this point but where two colors are used, two cylinders are employed. The numerals 5, 6, 7 and 8 indicate plate cylinders adapted to print in several colors on the opposite side of the sheet which has previously received printed impressions from the cylinders 3 and 4; 9 represents the parent roll of paper; 10 represents a roll of paper known as a tympan or smut sheet; 11 represents the take up or rewind roll for the tympan; 12 indicates power driven friction rolls which cause the tympan to be rewound on the floating shaft 11.

The operation of the press is as follows:

Paper is drawn from the parent roll by appropriate mechanism, not shown, functioning to advance the paper, in the upper right hand portion of the drawing. The paper sheet first passes between the impression cylinder 2 and one or more plate cylinders 3 and 4 which apply inked impressions to what may be termed the under surface of the paper sheet. The paper sheet bearing freshly printed impressions on its under side, as described, now passes into contact with the impression cylinder 1 and is printed upon successively by the plate cylinders 5, 6, 7 and 8. The printed sheet leaves the impression cylinder 1 at the upper right hand portion of the drawing as a sheet which has been printed with four colors on its top surface and two colors on its under surface. During the passage of the sheet of paper which contains the printed impressions, over the impression cylinder 1, the tympan 10 remains constantly interposed between the under side of the paper and the impression cylinder 1. The progression of the tympan is approximately the same as the rate at which the printed sheet passes through the press. The tympan, as will be observed, at any point where any of the impression cylinders 5, 6, 7 and 8 are effective is placed under pressure contact with the freshly printed ink deposited on the under surface of the paper by the plate cylinders 3 or 4 or both. If the tympan were constructed of ordinary paper, the ink from the cylinders 3 and 4 would not only be readily absorbed but would off-set and the design would be smudged and distorted. It was therefore proposed to constitute the tympan not of ordinary paper but of oiled paper, the idea being that the paper was thereby rendered, to a certain extent, ink repellent. Oiled paper of this character was generally made by feeding previously calendered paper through an oil bath. The product, speaking of a specific typical example, was a paper defined as weighing 35 pounds on the basis of 24 by 36 inches, 500 sheets to the ream. This oiled paper exhibited a very uneven and ununiform surface. On the average such paper might have a thickness of four one-thousandths (4/1000) of an inch but at many portions of the paper it was less so that a tympan composed of oiled paper was incapable of maintaining a condition of uniformity with respect to the off-setting of ink

thereupon and the oil of the paper furthermore having apparent affinity for the oil of the ink, tended very soon to accentuate the off-setting of the ink. This condition becomes progressively worse as the tympan wound up on the roll 11 is reused as the tympan roll 10 becomes exhausted of tympan paper. The unsatisfactory performance of oiled tympan paper led me to seek a remedy by which the art of machine printing would be improved. The speed of the paper through the machine in the case for example of a magazine having national distribution may be at the rate of six thousand (6000) impressions per hour or say two hundred and fifty (250) feet per minute. The necessity of providing the most adequate means to prevent off-setting of ink and smudging is apparent. The thinner the tympan the longer will be the interval necessitated by changing tympan rolls. It was not possible, however, to reduce the thickness of the oiled paper to any substantial extent because the strength required for tympan paper is thirty-five pounds, according to the Mullen test. In order to satisfy conditions as to strength I start with a sheet of kraft paper approximately of a weight and thickness to that of the finished tympan. This kraft paper has a calendered surface applied to it in the mill where it is made. The calendered kraft paper is passed through bath of strong sulfuric acid for an exceedingly brief period of time so as to give the acid an opportunity of affecting only the outer surface of the paper without disintegrating the interior or middle portion of the paper. As soon as the kraft paper leaves the acid bath the acid is completely washed off. The effect of the acid upon the fibres of the kraft paper is to hydrolize the fibres. After the acid has been completely washed away the acid-affected kraft paper is again calendered and then becomes the finished tympan. A typical specimen of tympan paper produced in this manner corresponds to the following specifications:

Weight—32 pounds.
Basis—24 by 36 inches.
500 sheets to the ream.
Strength—40 to 45 pounds.
Mullen test; gauge approximately 3/1000 of an inch.

This tympan paper is a hard tough sheet and does not require compression in use like the oiled paper before the actual printing moment takes effect. In the oiled paper, every time a printing compression is made, the inked, raised parts of the plate cylinder are compressed into trough-like contours on the oiled sheet. Each corner or bend in the depression has a tendency to cause off-setting of ink. All of this is avoided by the use of tympan paper heretofore described as made in accordance with the process set forth. The tympan paper, the use of which is prescribed by me, is relatively uniform in thickness. The surface, while not absolutely smooth is composed of myriads of smooth topped projections of uniform height so minutely spaced apart as to constitute a substantially flat smooth surface. The spaces between the projections, not coming into contact with the ink of the printed sheet, participate in the perfection of the operations. The unevenness of the surface caused by the presence of the spaced projections also gives the tympan paper a better grip against the impression cylinder and therefore counteracts the tendency to slip which exists where oiled paper is used. The peculiar nature and character of my tympan paper cannot be perceived except by the aid of enlarging instrumentalities. To the touch the paper is smooth although the finger does not move or slip as readily across its surface as in the case of oiled paper. For identification of the tympan paper with respect to its use in printing presses it is preferable to impart a special color or tint to paper intended for such uses. Such coloring matter while serving to identify the roll of paper as paper to be used as tympan paper has no effect in the printing operation and is entirely neutral with respect thereto.

My tympan paper being relatively very hard and thin does not result in the production of such dents or matrices that are formed in oiled paper. Printing with the use of the described tympan paper has enabled the printing process to be carried on without noticeable smudging or off-setting far in excess of anything that was capable of being accomplished with the old oiled paper. In the use of my tympan paper another important element is that it is impervious to volatile oils and atmospheric conditions. In other words the paper does not shrink, crack or expand. It is firmer and does not slip readily in rewinding,—a quality which adds to its value as an off-set paper. The main advantage however in the use of my tympan paper is that it improves the quality of the printing and reduces the cost thereof.

In the drawing the improvement is illustrated in connection with the use of a re-winder 11 for the tympan. In some cases it is not necessary to use a traveling off-set sheet with the re-winder but the off-set sheet may be applied directly to the impression cylinder by fastening devices such as indicated at 13 in the drawing. In that case the tympan paper, although it moves with the impression cylinder, is stationary with respect thereto. The tympan paper for such so-called stationary use would be made thicker and heavier than paper intended for use as a traveling off-set sheet.

Various changes in the specific form shown and described may be made within the scope of the claims without departing from the spirit of my invention.

So far as concerns the ink-repellant characteristics of the described tympan paper it is apparently a quality derived from the special surface tension possessed by the surfaces of the paper as hereinabove described by me and while I cannot be entirely certain of this I believe it to be the fact.

I claim:

1. In a printing press, means for minimizing offset at the freshly printed side of a paper web travelling between a plate cylinder and an impression cylinder with the freshly printed side towards the impression cylinder, which comprises a thin tough tympan having a fibrous structure in its interior and a relatively hard calendered exterior surface of acid-affected cellulosic products of fibers of the same type as the interior.

2. In a printing press, means for minimizing offset at the freshly printed side of a paper web travelling between a plate cylinder and an impression cylinder with the freshly printed side towards the impression cylinder, which comprises a thin tough tympan of fibrous material having a calendered surface rendered ink repellent by a relatively short acid treatment of the surface of the material followed by washing prior to this final calendering.

3. In a printing press, means for minimizing offset at the freshly printed side of a paper web travelling between a plate cylinder and an impression cylinder with the freshly printed side towards the impression cylinder, which comprises a thin tough tympan of unsized kraft paper having a fibrous kraft paper middle and relatively hard calendered exterior surfaces of acid-affected portions of the kraft paper.

4. In the machine printing art the means of substantially eliminating or minimizing offset at the freshly printed side of a paper web travelling between a plate cylinder and an impression cylinder with the freshly printed side toward the impression cylinder, which comprises a relatively thin tough parchmentized paper travelling tympan, having a fibrous structure in its interior and a somewhat harder and denser relatively non-ink absorbing exterior surface of parchmentized cellulosic fibres of the same type as the interior.

In testimony whereof I have hereunto set my hand.

OZRO P. SMITH.