Dec. 19, 1933. F. W. HOCH 1,939,814

APPARATUS FOR TESTING PRINTING INK AND PAPER

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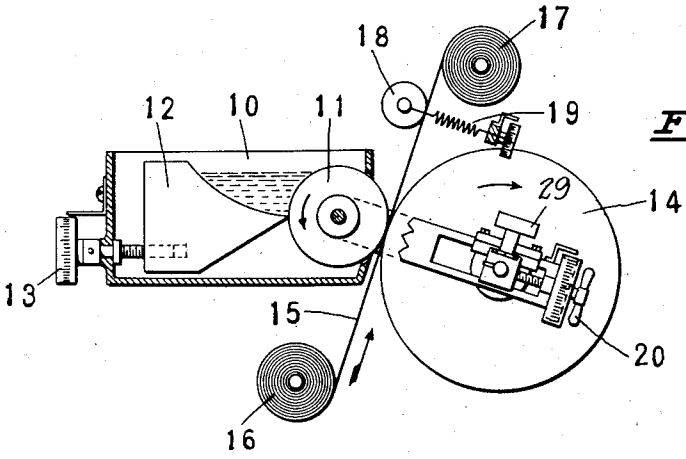
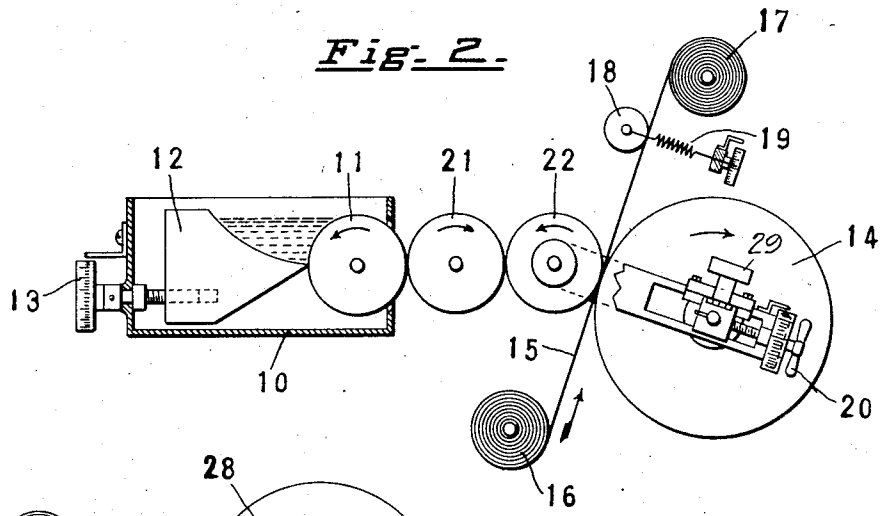


Fig. 1.

Fig. 2.



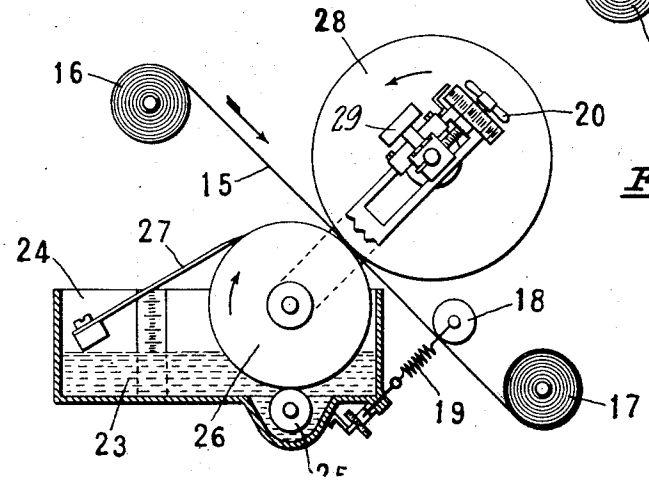


Fig. 3.

INVENTOR
Fred W. Hoch,
BY
ATTORNEY

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APPARATUS FOR TESTING PRINTING INK AND PAPER

Fred W. Hoch, Brooklyn, N. Y.

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13 Claims. (Cl. 73—51)

This invention relates to an apparatus for testing ink and the adaptability of a paper for a particular ink.

In the printing art today, the characteristics of printing inks are not known but only approximated. For example, when estimating on an amount of ink for a certain job there is no way of knowing what this amount is except by trial and this is expensive, especially where conditions are later found to be not the most economical. Where a workman is allowed only a certain amount of ink for a job, he may use more at first than he should and then when he finds he is not coming out as expected he may dilute the ink to the detriment of color or tonal strength in the work. There are many factors which affect ink economy.

That ink is the most economical which gives the greatest coverage of paper, while at the same time giving a satisfactory tonal strength when applied to the paper and dry, is well known. One factor affecting coverage is the thickness of ink film applied to the paper. This is not the only factor however, because the paper is another vital factor, some papers are more absorptive of ink than others, with the result that those which absorb more than others require more ink to give the requisite tonal strength. Again certain papers have a smoother surface than others, thereby requiring less pressure or squeeze of the ink on application to the paper than would be necessary to apply the ink to the unevennesses of the paper surface. Certain inks are more fluid than others and capable of giving the desired color or strength when applied as a thinner film than are other inks. The element of squeeze is another factor affecting ink consumption in printing because the greater pressure of squeeze on the paper during application of the ink, the greater the economy of ink. An objection to too much squeeze is hastened wear of the type and in the bearings of the plate and impression rolls. Economy of type is an important factor so that generally large squeeze is not desired.

These various factors affecting ink and paper economy are not so related that the effect of varying some one element can be predetermined upon the other factors without test. So far there has been no way known for measuring the effect upon these other factors when some one of them has been changed, nor has any way previously been known for reconciling these various factors in order to obtain more economical conditions except long experience.

An object of this invention is to measure these factors affecting the adaptability of various inks and papers and reconcile or correlate them to obtain greater economy in printing.

Referring to the drawing,

Fig. 1 shows a simple embodiment of this invention using a plane plate roll.

Fig. 2 is a modification showing the use of a type roll which may be either solid like text matter or half tone.

Fig. 3 is another modification showing the invention for use with a rotogravure cylinder for intaglio printing.

Referring to the drawing, the apparatus within the space 10 is an ordinary ink fountain of small size which, like the customary fountain, is provided with an ink roll 11 and an adjustable blade 12 which controls the thickness of ink film supplied to the roll 11. Unlike the usual fountain, the blade 12 is mounted for precise adjustment by means of a micrometer screw handle 13 which is preferably graduated to indicate the separation of the blade 12 from the ink roll 11 in thousandths or ten-thousandths of an inch. In order to avoid the possibility of accidental engagement and wear between the blade 12 and the roll 11, the blade is preferably provided with a stop, not shown, so as to limit its approach to the roll, to, say, one thousandth of an inch, as this is about the minimum thickness of ink film ever desired. Cooperating with the plate or ink roll 11 is an impression roll 14 and a paper strip 15 passes between the rolls 11 and 14. The paper strip is likewise narrow though preferably a little wider than the ink rolls. For example, where the ink roll 11 is an inch in length the paper may be about two inches in width, leaving a half inch margin on each side. Some convenient form of supply roll 16 enables the paper to receive ink from the plate roll 11 and then pass to the wind up roll 17. It will be understood that the rolls 11 and 14 are driven so that their peripheral speeds are the same and the speed of these rolls determines the speed of the paper. For a given thickness of ink film selected to give the desired tonal strength, the roll of test paper can be run and the length of paper inked will be a measure of the ink coverage when a measured quantity of ink is supplied to the fountain. For example, if one cubic inch of ink is supplied to the fountain the area which this ink will cover with a particular thickness of film can be measured by the length of paper consumed until the ink is used up, the width of the inked portion of the paper being

known so that the length of the paper strip is always proportional to the area covered. For measuring length, a friction wheel of predetermined size such as 11, 14 or 18 may engage the paper and be rotated thereby to measure the length of paper inked, or other well known ways for measuring the length of the strip of paper may be used. Of course, to measure the distance traversed by a wheel of known size, revolution counter 29 is generally used in connection with the wheel, such as is shown on the shaft of the roll 14.

The rapidity of drying is another factor of importance to the printer, especially for high speed operation. The amount of pressure which a newly inked sheet can stand against a superposed sheet without having a transfer of the ink to the superposed sheet is known as "offset" and is a measure of the drying character of the ink where the drying period is the same. Therefore, as the pressure on the paper on the wind up roll 17 is a measure of offset, to make this pressure adjustable a friction roll 18 may apply pressure to the paper being wound and the pressure adjusted by means of an adjustable spring 19. The indicator shown indicates the pressure of the roll 18 on the paper. The pressure screw shown in the drawing as controlling the tension of the spring 19 must be adjusted in determining offset under given conditions. Under new conditions offset is determined by adjusting the pressure of the roller 18 against the paper until such pressure is just strong enough to cause a transfer of ink onto a contiguous layer on the wind-up roll 17.

Where the drying character of the ink can stand only a low pressure before it is transferred to a superposed sheet, this measure of offset indicates to the press operator that the new work can only be stacked with a particular small amount of pressure and therefore he will not allow the finished work to be subjected to greater pressures likely to damage the work.

The plate and impression rolls 11 and 14 are mounted in non-yieldable bearings so that the linear separation between their peripheries is a measure of squeeze with a given paper thickness. To accurately control and measure the linear distance between these rolls, a micrometer adjusting screw 20 and indicator is provided which is preferably graduated into thousandths or ten-thousandths of an inch, such screw and indicator affording a measure of squeeze with a given paper.

Fig. 2 is a view similar to Fig. 1, except that the paper is printed from the type roll 22 which may be of either solid type (text matter) or half tone. In fact, each type of roll may be provided and the selection made for test according to the type of work. As is usual with type rolls, a transfer roll 21 is placed between the ink roll 11 and the type roll 22. The blade 12 is adjusted until the ink does not flood the type cylinder.

With the apparatus shown by Fig. 2, the thickness of film, coverage squeeze and offset can be measured for half tone or solid type matter according to the type of work for which the test is being conducted. For changing from solid type to half tone the roll 22 may be withdrawn and another roll substituted in its place without affecting the squeeze measure of the micrometer 20.

In Fig. 3 for testing ink and paper for rotogravure work, the fountain 24 has an ink roll 25 rotating beneath the surface 23 of the bath of ink and in engagement with the roll 26 or etched cylinder. As is usual in intaglio printing, the doctor blade 27 engages the etched cylinder 26 to scrape off the excess ink. The impression roll 28 in Fig. 3, instead of being a plane steel surface as is the case in Figs. 1 and 2, must have a rubber or yieldable coating, as is common with intaglio printing. The thickness of ink film is measured by the depth of etching. The ink consumption is accurately measured by the change in level of the ink within the fountain according to any convenient and well known means such as the graduations shown for measuring precise changes in liquid level. Squeeze and offset may be measured as before. In Fig. 3 it will be noted that the wind up roll is located below instead of above.

Among the advantages of this invention may be mentioned that it permits the economical selection of printing inks and appropriate papers adapted therefor. It enables a better estimation of costs to be made for a particular job and is the first to provide a means for accurately measuring the thickness of ink film. After suitable tests show the most economical ink and paper to give the best tonal strength the result of the tests may be transmitted to the press room for the guidance of the printing press operators. The pressman adjusts his fountain to give the tonal strength corresponding to that obtained in the test; in other words, the adjustment of ink film thickness is determined by the eye of the pressman from the color of the specimen. The ordinary commercial presses today do not provide for a micrometer adjustment of squeeze so in order to obtain a squeeze corresponding to the one used in the test, the pressman will add or substract layers of paper of known thickness from his impression roll and in this way obtain substantially the desired squeeze. The information as to coverage of a unit quantity of ink enables the pressman to estimate quite accurately how much ink he will need for the particular job. The value of offset enables the pressman to know what pressure can be safely put on the product coming from the press or in other words, how small the pile of new work must be kept.

I claim:

1. In an apparatus of the class described, the combination with an ink dispensing fountain supplying a substantially non-yieldable roll, of a cooperative roll whereby ink may be applied to a sheet of paper between said rolls, means for measuring the thickness of ink film as the same is applied to said paper and means for use in measuring the squeeze pressure on said paper during the application of ink.

2. In an apparatus of the class described, the combination with an ink dispensing fountain supplying a substantially non-yieldable roll, of a cooperative substantially non-yieldable roll whereby ink may be applied to a sheet of paper between said rolls, means for measuring the thickness of ink film as the same is applied to said paper, means for measuring the squeeze pressure on said paper during the application of ink and means for use in measuring the coverage of a measured quantity of ink in said fountain.

3. In an apparatus of the class described, the combination with an ink dispensing fountain including a roll, of a cooperative roll whereby ink may be applied to a sheet of paper between said rolls means for measuring the thickness of

ink film applied to said paper and means for measuring the coverage of a measured quantity of ink in said fountain.

4. In an apparatus of the class described, the combination with an ink dispensing fountain supplying a roll, of a cooperative roll whereby ink may be applied to a sheet of paper between said rolls, means for measuring the thickness of ink film applied to said paper, means for measuring the coverage of a measured quantity of ink in said fountain and means for measuring offset of ink applied to the paper.

5. In an apparatus of the class described the combination with an ink fountain and a plate roll supplied thereby, of an impression roll for cooperating with said plate roll, means for feeding paper between said rolls, micrometer means for measuring the linear separation between said rolls, and micrometer means for measuring the thickness of ink film supplied by said fountain to said plate roll.

6. In an apparatus of the class described the combination with an ink fountain and a plate roll supplied thereby, of an impression roll for cooperating with said plate roll, means for feeding paper between said rolls, micrometer means for measuring the linear separation between said rolls, micrometer means for measuring the thickness of ink film supplied by said fountain to the paper and means for measuring the pressure on said paper after passing between said rolls for use in determining offset of the ink applied to the paper.

7. In an apparatus of the class described, the combination with plate and impression rolls, of means for feeding a strip of material between said rolls, an ink fountain for supplying the plate roll, means for measuring the thickness of the ink film as the same is applied to the plate roll, and means for use in measuring offset of the ink applied to the material strip.

8. In an apparatus of the class described, the combination with plate and impression rolls, of means for feeding a strip of material between said rolls, an ink fountain for supplying the plate roll, means for measuring the thickness of the ink film as the same is applied to the strip of material, and means for measuring the length of said strip material as the same is passed between said rolls.

9. In an apparatus of the class described, the combination with plate and impression rolls, of means for feeding a strip of material between said rolls, an ink fountain for supplying the plate roll, means for use in measuring offset of the ink applied to the material, and means for use in measuring the squeeze pressure on said strip material passing between said rolls.

10. In an apparatus of the class described, the combination with plate and impression rolls, of means for feeding a strip of material between said rolls, an ink fountain for supplying the plate roll, means for measuring the thickness of the ink film as the same is applied to the plate roll, means for use in measuring offset of the ink applied to the material, means for measuring the length of the strip material as the same is passed between said rolls, and means for use in measuring the squeeze pressure on said strip material passing between said rolls.

11. In an apparatus of the class described, the combination with a roll to which ink is applied, and a cooperative substantially rigid roll, of means for feeding a strip of material between said rolls, means for supplying ink to the first mentioned roll, means for measuring the length of the strip material as the same is passed between said rolls, and means for adjusting and measuring the separation of said rolls for use in measuring the squeeze pressure on said strip material.

12. In an apparatus of the class described, the combination with a roll to which ink is applied, and a cooperative substantially rigid roll, of means for feeding a strip of material between said rolls, and means for supplying ink to the first mentioned roll, means for measuring the length of the strip material as the same is passed between said rolls, means for adjusting and measuring the separation of said rolls for use in measuring the squeeze pressure on said strip material, and means for measuring the thickness of the ink film as the same is being applied to the strip of material.

13. In an apparatus of the class described, the combination with a roll to which ink is applied, and a cooperative substantially rigid roll, of means for feeding a strip of material between said rolls, means for supplying ink to the first mentioned roll, means for measuring the length of the strip material as the same is passed between said rolls, and means for measuring the thickness of the ink film as the same is being applied to the strip of material.

FRED W. HOCH.