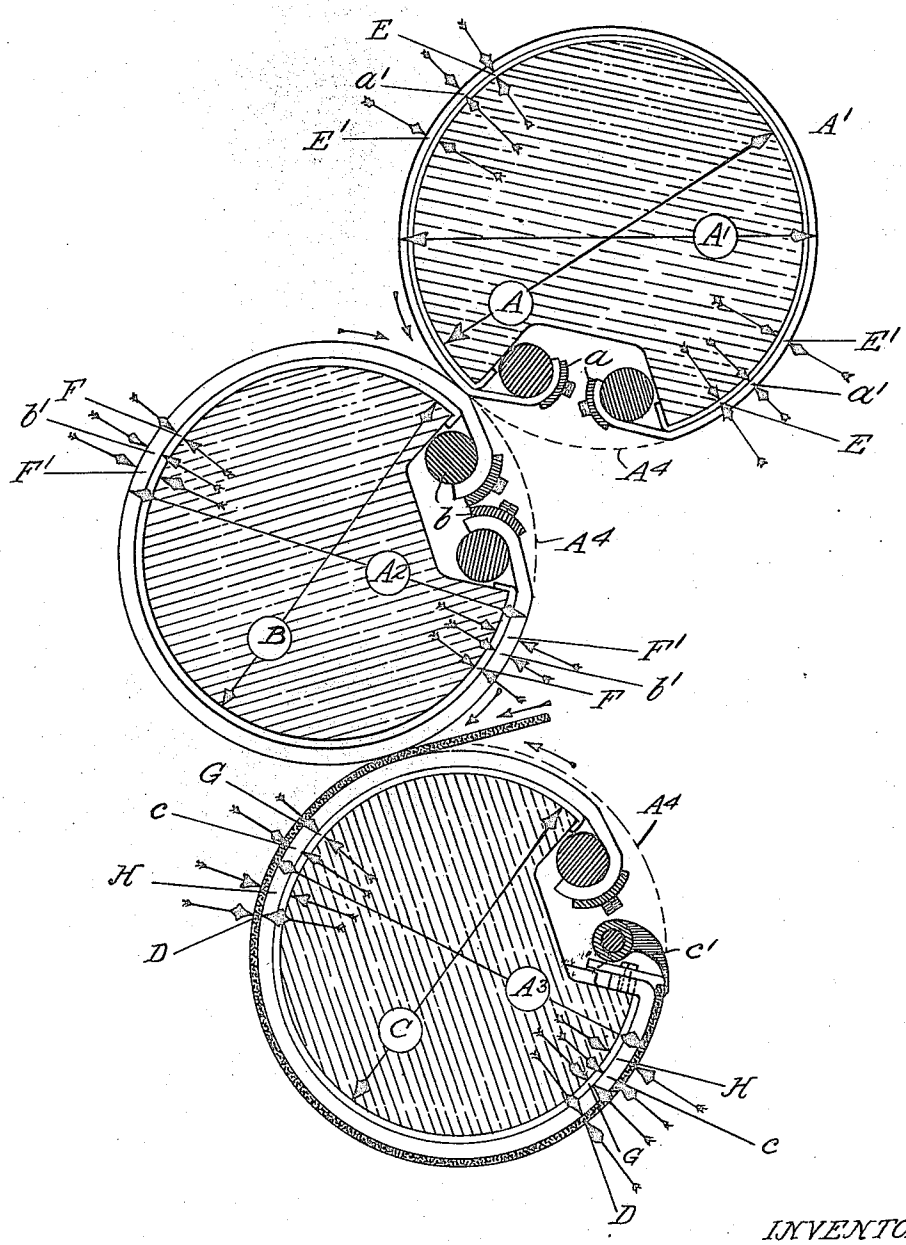
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METHOD OF AND MEANS FOR PREPARING CYLINDERS OF OFF-SET PRINTING MACHINES

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METHOD OF AND MEANS FOR PREPARING CYLINDERS OF OFFSET PRINTING MACHINES.

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To all whom it may concern:

Be it known that I, WILLIAM C. HUEBNER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Methods of and Means for Preparing Cylinders of Offset Printing Machines, of which the following is a specification.

This invention relates to off-set printing presses and more particularly to the relative proportioning and method of building up the cylinders of the same in such a manner as to insure uniform and accurate printing and to avoid an increase in the size of the dots, lines or grains which constitute the image and the formation of streaks or smears when printed upon the paper or other print-receiving sheets.

It has been found that at certain times an off-set printing press will print in such a manner that the dots, lines or grains are of enlarged size, thus producing a heavier impression than is produced from the same plate in a proof press. The cause of this has not been known and was generally attributed to the rubber transfer blanket upon which the ink is transferred from the printing plate, it being thought that the contact between the transfer blanket and the paper or other material presses out the ink so as to increase the size of the dots, lines or other marks which form the image. Various means have been employed for preventing this heaviness in the prints; for example, the dots, lines or grains constituting the image on the plates have been made smaller, but this resulted in producing such a light print on the proof press that the finished proofs were rejected by customers, also acids have been used to etch the plates and reduce the size of the dots, etc., on the press plates. This, however, spoiled the plates and did not produce the desired results. Another defect in presses of this kind is that at times the prints have streaks or lines of slurring, extending across the print, caused by the periodical enlarging of the dots, lines or grains, the remaining portions of the printing being fairly well done. These defects in the press were only noticed at certain times and it frequently happens that the same press will produce a first class job while the next job is so defective as to be useless.

I have found that the real cause for the production of these defective prints in an off-set printing press from a plate which produces good proofs on the proof press is due to the fact that the peripheral speeds of the surface of the cylinders of the press are not always the same, and that a slight difference in the peripheral speeds of these cylinders causes a considerable enlargement of the dots, lines or grains, due to the dragging of the surface of one cylinder relatively to the surface of the other and to the fact that in off-set printing presses as now constructed, differences in the thickness of the paper and in the printing plate are frequently compensated for by changing the centers of the cylinders relatively to each other. This causes the gears connecting the cylinders to move slightly out of proper mesh, so that the back lash in the gears plus the slight variation of cylinder peripheral speeds will spoil the prints.

One object of this invention is to produce an off-set printing press and method of building up the cylinders thereof, such that the operator will be readily enabled to adapt the press for any variations in the thickness of the paper or other material to be printed, in the plates and in the off-set printing blanket without changing the relative surface speeds of the cylinders, and without necessitating the changing of the working or printing centers of the cylinders.

In the accompanying drawing:

The figure is a sectional view of the three cylinders of an off-set printing press embodying the invention.

A represents the printing plate cylinder which is provided with the usual or any suitable means *a* for securing a printing plate *a'* to the periphery of the cylinder. B represents the printing blanket cylinder which is also provided with the usual or any suitable means *b* for securing the usual rubber or yielding blanket *b'* on the cylinder, and C represents the impression cylinder which is preferably provided with a yielding impression cylinder blanket *c* which is suitably secured on the cylinder, and with paper gripping devices *c'* of usual or suitable construction by means of which a sheet of paper or other material D to be printed is held on the cylinder. The cylinders are caused to turn simultaneously in the required directions, indicated by the

arrows, by intermeshing gears (not shown) at their ends. All of these parts have heretofore been used in off-set printing machines and, of themselves constitute no part of this invention.

In order to prevent differential movement between the peripheries of the cylinders, the outside or overall diameters of the cylinders, including the plates, blankets, print-receiving sheets or other parts mounted thereon, must always be the same. For this purpose the cylinders proper are all made of a diameter smaller than the pitch diameter of the gears connecting the cylinders, which pitch diameter in presses having their cylinders geared together is the same as the overall diameter of the cylinders, and underlays of any suitable kind are placed underneath the printing plate, transfer blanket or impression cylinder blanket, or print-receiving sheet, so that the diameters of all of the printing or print-receiving surfaces of these cylinders will be the same as the pitch diameter of the gears connecting the cylinders. The pitch diameters of the gears are indicated by the lines A' A^2 and A^3 respectively, and the printing or print-receiving surfaces of the several cylinders are indicated by the broken lines A^4. This may be accomplished in the case of the printing plate cylinder in the following manner:

The printing plates for a given type of off-set presses usually are not more than .014 of an inch in thickness but in order to be sure of accommodating even thicker plates up to say .020 of an inch, the printing plate cylinder is preferably made of a diameter of about .040 of an inch less than the pitch diameter A' of the gear at its end, so that the cylinder can accommodate a printing plate of .020 of an inch thickness. If the printing plate is less than .020 of an inch in thickness, an underlay E of any suitable material is used which is of such thickness that the combined thickness E' of the printing plate and underlay amounts to .020 of an inch. For example, if the printing plate is .014 of an inch in thickness, then an underlay sheet of .006 of an inch in thickness is used. This is desirable since a fairly tough, heavy underlay sheet for the average plates, is not so apt to tear or wrinkle as a thinner sheet. A plurality of underlay sheets of different thicknesses are therefore provided which can be used in connection with different printing plates and in setting up the machine for a job, the thickness of the printing plate is first determined in any suitable way. The operator then consults the upper table of the chart shown in Fig. 2 and sees at once the thickness of the underlay necessary in connection with the printing plate.

In the case of the printing blanket cylinder, it is desirable to make allowance for the thickness of the blanket and an additional .001 or .002 of an inch is preferably allowed for pressure in order to compensate for the minimum amount of depression in the yielding blanket at the proper ink-lifting condition. If, for example, allowance is made for a blanket and underlay sheet of .075 of an inch in thickness the printing blanket cylinder is made .150 of an inch smaller in diameter than the pitch diameter A^2 of the gear to which the printing plate cylinder is connected. The combined thickness F' of the blanket b' and the underlay F for this cylinder must in such case amount to .076 or .077 of an inch. After determining the thickness of the transfer blanket the operator employs the second table of the chart in Fig. 2 and ascertains the thickness of the underlay in the same manner as described for the printing plate cylinder.

The diameter of the impression cylinder must be less than the pitch diameter A^3 of the gear connected thereto by an amount sufficient to enable the cylinder to carry a print-receiving sheet D of the maximum thickness which may be used on the press, and an underlay G and preferably also an impression blanket c. The combined thickness H of the print-receiving sheet or paper, blanket and underlay indicated on the third table of the chart is .078 of an inch, this dimension having been found satisfactory, as it avoids the use of very thin underlay sheets. When thicker paper is used a thinner underlay is employed provided the same impression blanket is used, and when the paper is thin a thicker impression blanket or underlay must be used, so that the combined thickness of the paper, blanket and underlay is always sufficient to bring the external diameter A^3 of the cylinder and parts carried thereby up to .078 of an inch.

The dimensions given are only illustrative and are not intended in any way to limit the construction of printing presses of this kind under this invention. It is desired, however, to provide a series of underlays of different thickness for each of the cylinders and by means of the table shown in Fig. 2 the printer, when he ascertains the thickness of the printing plate, of the printing and impression blankets and of the print-receiving paper can immediately determine the thickness of underlays which are required and can readily build up his cylinders accordingly. Consequently the external diameters of the cylinders and parts mounted thereon are always the same, thereby eliminating all rubbing or differential movement between the cylinders, and since it never becomes necessary to change the distance between working or printing centers of the cylinders the gears always re-

main in perfect mesh, so that streaks or lines in the prints are avoided. In this manner a correct reproduction is produced at all times with a uniform but minimum printing pressure and the re-etching of the printing plate or other objectionable practices for reducing the size of the dots, dashes and other parts constituting the image is avoided.

I claim as my invention:

1. In an off-set printing machine, the combination of a plurality of cylinders, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than the pitch-line diameters, a printing plate secured on one of said cylinders of a known thickness less than the radial difference between its cylinder and the pitch-line thereof, and an underlay placed between said cylinder and its printing plate and being of known thickness equal to the radial difference between the cylinder plus the thickness of the plate and said pitch-line, so that the combined thickness of said underlay and printing plate will give the external cylindrical surface of said printing plate a diameter equal to the pitch-line diameters.

2. In an off-set printing machine, the combination of a plurality of cylinders, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than said pitch-line diameter, one of said cylinders carrying a print receiving sheet of a known thickness less than the radial difference between the surface of said cylinder and the pitch-line thereof, and an underlay placed between said cylinder and the print receiving sheet, said underlay being of known thickness equal to the radial difference between the cylinder plus the thickness of said print receiving sheet and the pitch-line thereof so that the combined thickness of said underlay and print receiving sheet will give the external cylindrical surface of said print receiving sheet a diameter equal to said pitch-line diameters.

3. In an off-set printing machine, the combination of a plate cylinder carrying a printing plate, an impression cylinder carrying a print receiving sheet, a blanket cylinder provided with a printing blanket which contacts with said plate and sheet for transferring the impression from said plate to said print receiving sheet, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than said pitch-line diameters, said blanket being of a known thickness less than the radial difference between its cylinder and the pitch-line thereof, and an underlay between said blanket and its cylinder of known thickness equal to the radial difference between the cylinder plus the thickness of the blanket and said pitch-line so that the combined thickness of said underlay and blanket will give the external cylindrical surface of said blanket a diameter equal to said pitch-line diameters.

4. In an off-set printing machine, the combination of a plate cylinder carrying a printing plate, an impression cylinder carrying a print receiving sheet, a blanket support provided with a printing blanket which contacts with said plate and sheet for transferring the impression from said plate to said print receiving sheet, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than said pitch-line diameters, said printing plate and print receiving sheet being of known thicknesses less than the radial difference between their respective cylinders and said pitch-lines, and underlays between said printing plate and its cylinder and between the print receiving sheet and its cylinder, said underlays being of known thicknesses equal respectively to the radial differences between the plate cylinder plus the thickness of the plate and the pitch-line thereof and the impression cylinder plus the thickness of the sheet and the pitch-line thereof so that the external surfaces of said plate and said sheet will be of equal diameters and said plate, blanket and sheet will all have equal surface speeds.

5. In an off-set printing machine, the combination of a plate cylinder carrying a printing plate, an impression cylinder carrying a print receiving sheet, a blanket cylinder provided with a printing blanket which contacts with said plate and sheet for transferring the impression from said plate to said print receiving sheet, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than its pitch-line diameter, said plate, print receiving sheet and blanket each being of a known thickness less than the radial difference between the respective cylinders and the pitch-lines, and an underlay between each of said cylinders and the plate, blanket or sheet thereon, said underlays being of known thicknesses equal respectively to the radial differences between said respective cylinders plus the thickness of the plate, blanket or sheet thereon and said pitch-lines so that the external surfaces of said plate, blanket and sheet will all have equal diameters.

6. In an off-set printing machine, the combination of a plate cylinder carrying a printing plate, an impression cylinder carrying a print receiving sheet and a blanket

under said sheet, a blanket cylinder provided with a printing blanket which contacts with said plate and sheet for transferring the impression from said plate to said print receiving sheet, said cylinders having equal gear pitch-line diameters and each of said cylinders having a peripheral diameter which is a known amount less than said pitch-line diameters, and an underlay between each of said cylinders and the plate or blanket thereon, said underlays being of known thicknesses equal to the radial differences between the said cylinders plus the plate or blanket and sheet thereon and pitch-lines so that the external surfaces of said plate, printing blanket and sheet will have equal diameters.

7. The herein described method of preparing cylinders of an off-set printing machine having a cylinder with a printing plate, an impression cylinder, and means with a printing blanket for transferring the impression from said plate to a print receiving sheet on the impression cylinder, which method consists in employing cylinders having equal gear pitch-line diameters, and each cylinder having a peripheral diameter which is a known amount less than the pitch-line diameters, using a printing plate on the printing cylinder of known thickness less than the radial difference between the surface of the cylinder and the pitch line thereof and using a print receiving sheet of known thickness less than the radial difference between the surface of said impression cylinder and the pitch-line thereof, and placing underlays under the printing plate and print receiving sheet, said underlays being of known thicknesses and equal respectively to the radial differences between the printing plate cylinder plus the printing plate and the impression cylinder plus the print receiving sheet and their pitch-lines so that the external surfaces of said plate and said sheet will have the same diameters and will travel at the same surface speed as said printing blanket.

8. The hereindescribed method of preparing cylinders of an off-set printing machine having a cylinder with a printing plate, an impression cylinder and a cylinder with a printing blanket for transferring the impression from said plate to a print receiving sheet on the impression cylinder, which method consists in employing cylinders having equal gear pitch-line diameters, and each cylinder having a peripheral diameter which is a known amount less than said pitch-line diameters, and employing a printing plate, printing blanket and print receiving sheet of known thicknesses, each of which is of a thickness less than the radial difference between its respective cylinder and the pitch-line thereof, and placing under said printing plate, printing blanket and print receiving sheet underlays of known thicknesses respectively equal to the radial differences between the plate cylinder plus the thickness of its plate, blanket cylinder plus the thickness of its blanket and the impression cylinder plus the thickness of its sheet and their pitch-lines so that the contacting surfaces of the several cylinders will all have equal diameters and travel at equal surface speeds.

9. The herein described method of preparing the cylinders of an off-set printing machine having a cylinder with a printing plate, an impression cylinder and a cylinder with a printing blanket for transferring the impression from said plate to a print receiving sheet on the impression cylinder, which method consists in employing cylinders having equal gear pitch-line diameters and each cylinder having a peripheral diameter which is a known amount less than said pitch-line diameters, using a printing plate, blanket and print receiving sheet of known thicknesses on said cylinders, the thickness of said plate, blanket and sheet being less than the radial difference between the radius of its respective cylinder and the pitch-line thereof, and placing under said plate blanket and print receiving sheet underlays of known thicknesses, the thicknesses of said underlays being equal respectively to the radial differences between their respective cylinders plus the thickness of its printing plate, blanket or print receiving sheet and the pitch-lines so that the contacting surfaces on the several cylinders will all travel at equal surface speeds and all have diameters equal to each other and to the pitch-line diameters of the gears connecting the cylinders.

Witness my hand this 19th day of October, 1918.

WILLIAM C. HUEBNER.

Witnesses:
C. W. PARKER,
A. L. MCGEE.