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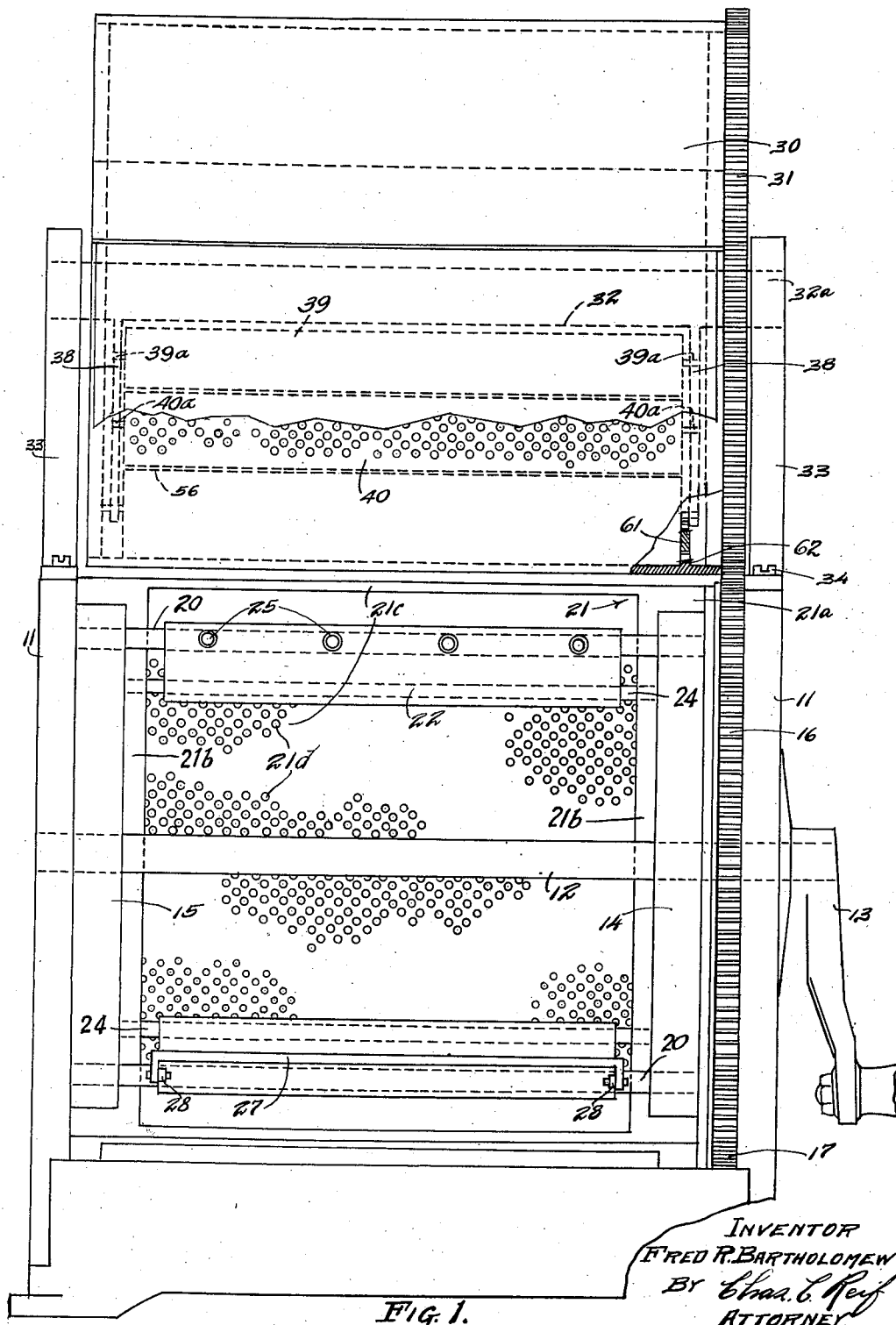
F. R. BARTHOLOMEW

2,180,135

PRINTING MACHINE

Filed July 1, 1937

4 Sheets-Sheet 1



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PRINTING MACHINE

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4 Sheets-Sheet 2

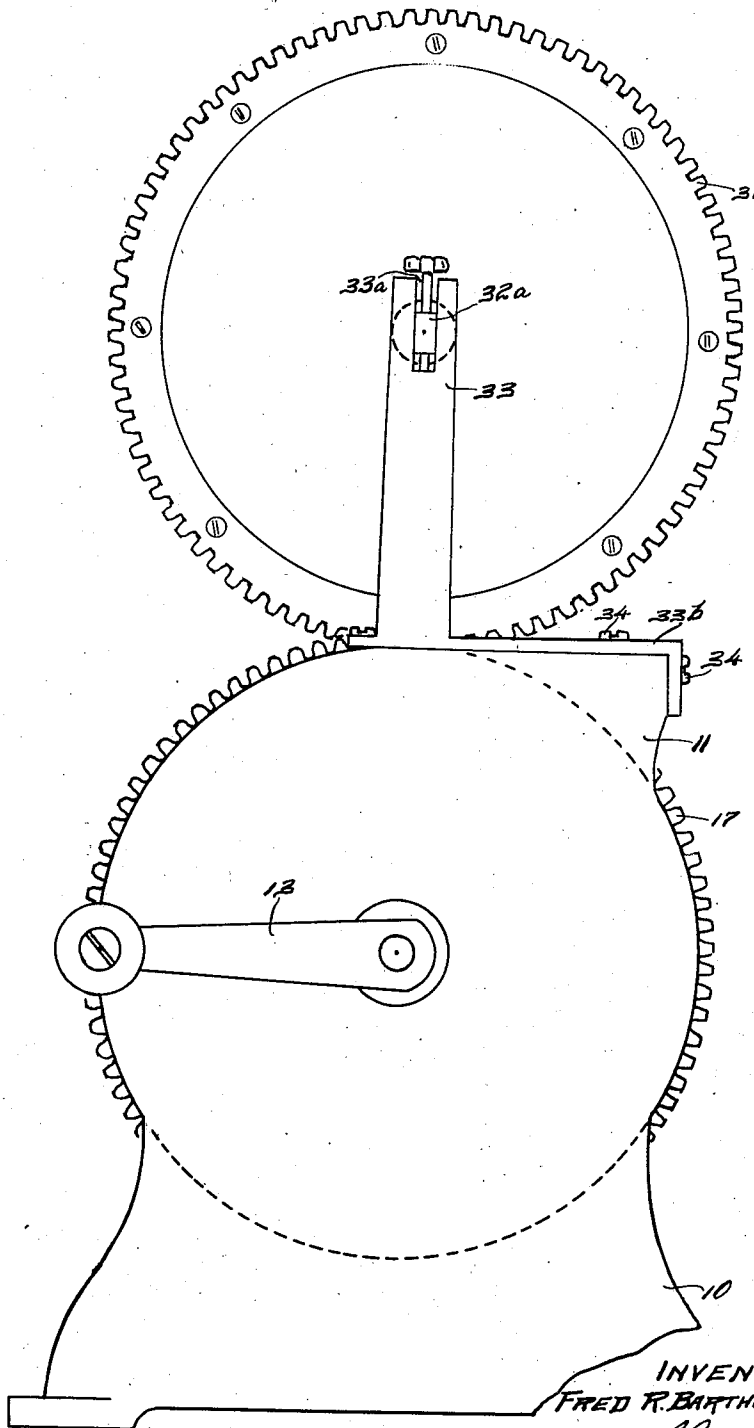


Fig. 2.

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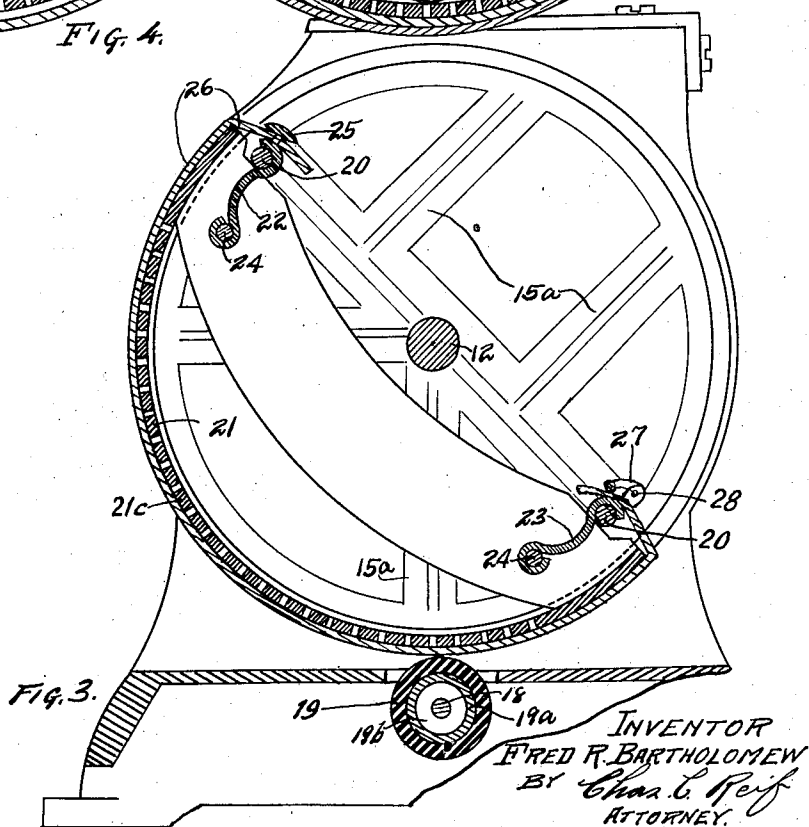
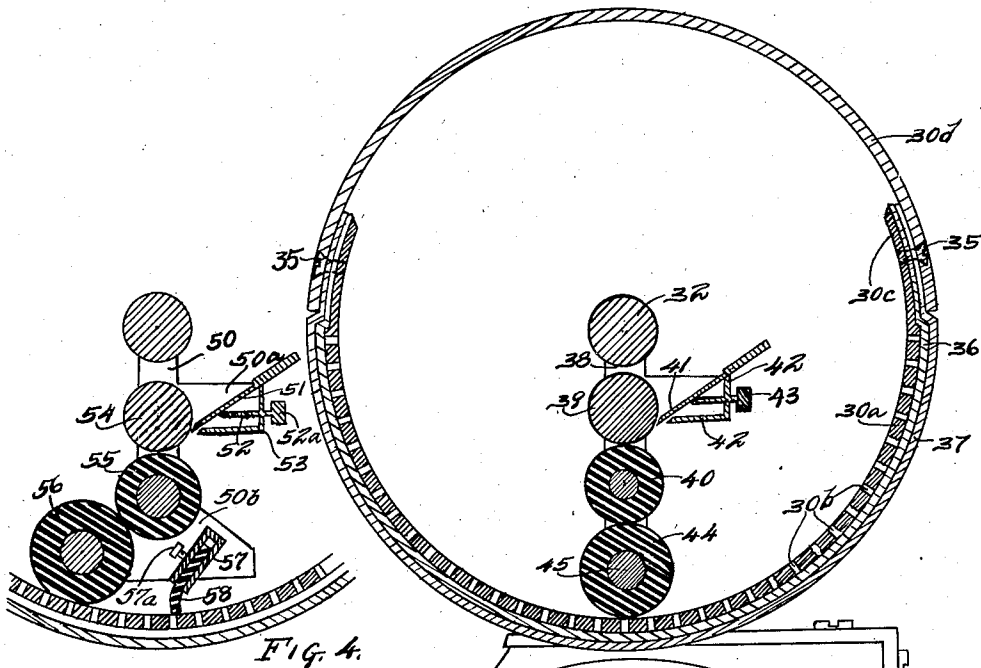
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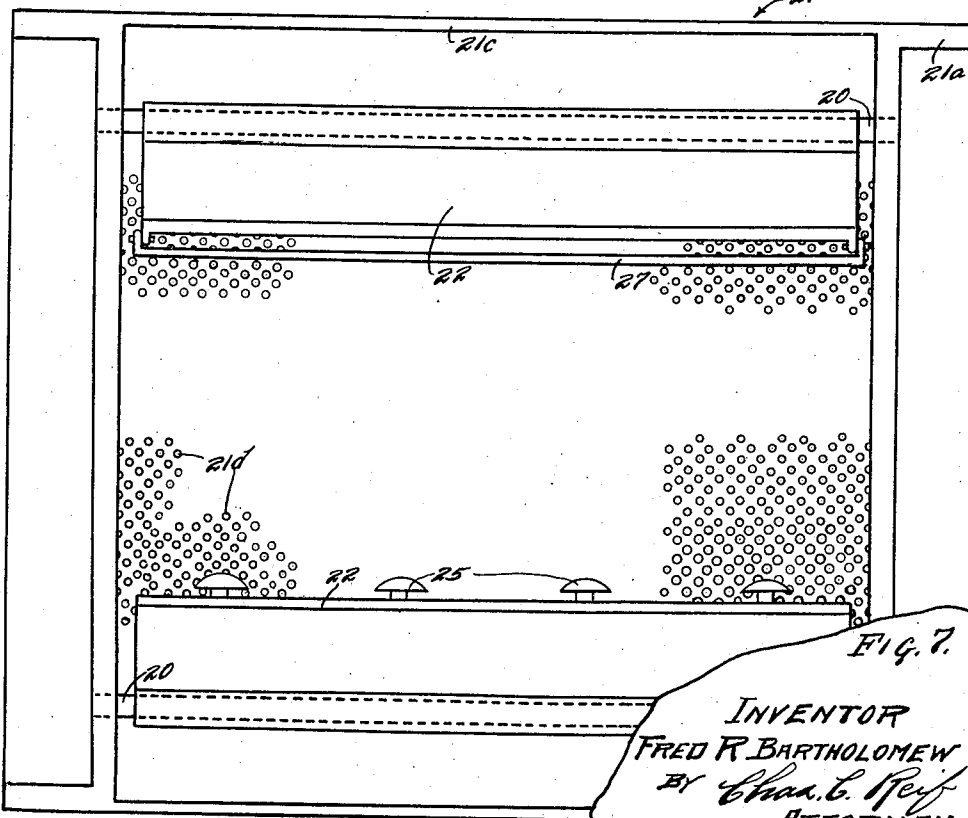
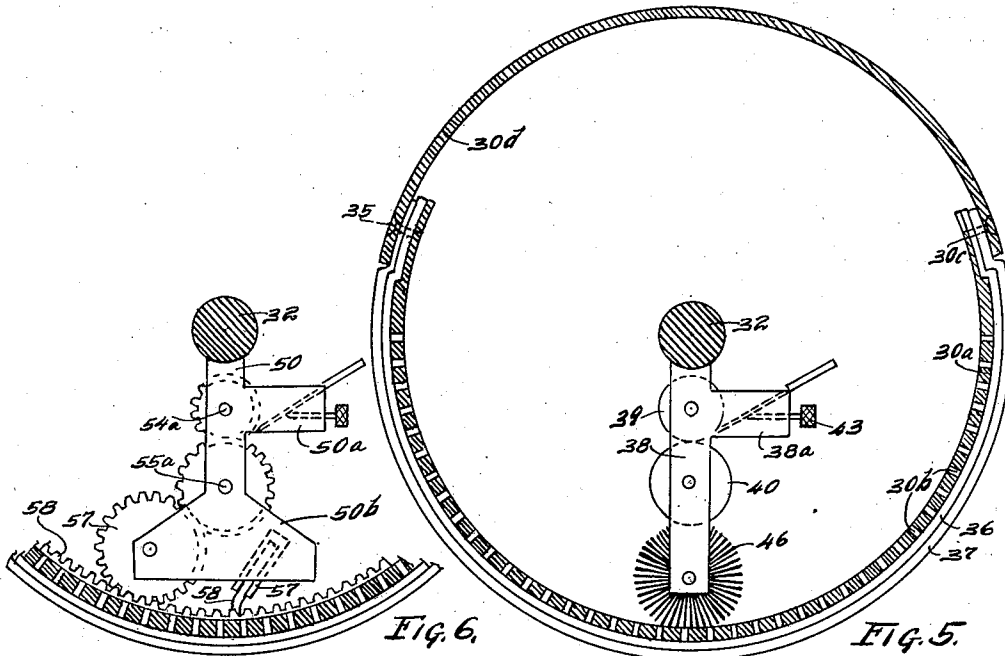
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PRINTING MACHINE

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4 Sheets-Sheet 4



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2,180,135

PRINTING MACHINE

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Application July 1, 1937, Serial No. 151,380

16 Claims. (Cl. 101-119)

This invention relates to printing devices and particularly to a printing machine of the smaller type constructed and arranged to do "Multigraph", "Mimeograph", hectograph and similar printing.

There are at present in this country an immense number of Multigraph machines. This machine includes two rotary rings carrying a detachable segment having transverse slots on its surface in which type are arranged. These machines are adapted for only one type of printing.

It is an object of this invention to provide a simple and efficient means by the use of which several types of printing may be done on such a small machine.

It is a further object of the invention to provide a novel form of segment for a small printing machine having rotary rings adapted to receive said segment.

It is still another object of the invention to provide an attachment for a small printing machine of the "Multigraph" type so that offset printing can be done on said machine.

It is also an object of the invention to provide a novel method and apparatus for doing hectograph printing.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a view in front elevation of a printing machine;

Fig. 2 is a side elevation of said machine;

Fig. 3 is a central vertical section through said machine;

Fig. 4 is a partial view similar to Fig. 3 showing a modification;

Fig. 5 is a partial vertical section through the supplementary cylinder similar to Fig. 3 showing the structure of the inking means;

Fig. 6 is a partial view similar to Fig. 5 showing a modification; and

Fig. 7 is a view in front elevation of a novel detachable segment used.

In the specification, the following terminology will be used:

The "rotary platen" is the rotary impression cylinder that coacts with the "primary printing cylinder" in the various methods of printing described.

The "primary printing cylinder" is a cylinder or a segment of a cylinder that revolves in con-

junction with the "rotary platen" in order to print on the paper that passes between them. In connection with the "Multigraph" the primary printing cylinder comprises two rings mounted on a revoluble shaft together with a segment removably attached to said rings.

The "printing couple" is the combination of the "primary printing cylinder" and the "rotary platen" revolving so as to coact with each other.

The "detachable segment" is a removable segment carried by and forming part of the "primary printing cylinder" and forming a portion of its peripheral surface. The detachable segment carries interchangeably on its convex surface the various types of printing mediums as will be described.

The "supplementary printing cylinder" is a rotary printing cylinder removably attached adjacent to and cooperating with the "primary printing cylinder", said cylinders being arranged so that they contact with each other and rotate in unison. The "supplementary printing cylinder" is in the nature of an attachment and carries interchangeably on its peripheral surface the various types of "printing members" which will be described.

The term "printing member" designates a pliable or flexible sheet of material that may be removably attached to the circumference of the "supplementary printing cylinder". It carries the image to be printed as a direct image, that is, not in reverse. Each "printing member" carries this image in such a way that it may be transferred to a printing medium. Where only the printing couple is in operation, the printing member is used in reverse on the primary printing cylinder.

The term "printing medium" is used to designate a pliable or flexible sheet of material that may be removably attached to the convex surface of the primary printing cylinder or of the detachable segment. A printing medium receives the image to be printed from the printing member by direct transfer and this transferred image is then printed on the paper from the printing medium. The image on the printing medium, therefore, always appears in reverse.

In connection with the foregoing it may be stated that each type of printing medium will be different in its composition from the other types of printing mediums in order to take the transfer of different kinds of printing inks that appear on different types of printing members. Thus a hectograph printing medium is a printing medium with a surface that will take a trans-

fer from a hectograph ink image on a printing member. A duplicating printing medium is a printing medium with a surface that will take a transfer from a duplicating ink image on a printing member. A lithograph printing medium is a printing medium with a surface that will take a transfer from a lithograph ink image on a printing member. Heretofore each of these methods of printing has required a separate machine and some of these machines are quite large and expensive. With the present invention and with the use of the "printing members" and "printing mediums" it is possible to perform the above mentioned methods of printing on one small and inexpensive machine.

Referring to the drawings, a machine is shown comprising a frame having a base 10 and vertically extending end plates 11. Revolvably mounted in the end plates 11 is a shaft 12, which shaft may be rotated by any suitable means such as a crank handle 13 secured thereto at the outer side of one end plate 11. Rigidly secured to the shaft 12 are a pair of rings 14 and 15. Said rings are shown as having outer portions from which extend inwardly, arms 15a, one of which extends diametrically and forms a hub. A gear 16 is also secured to shaft 12 and to ring 14, which gear meshes with another gear 17 secured to a shaft 18 which carries the platen cylinder 19. Platen 19 comprises a yielding portion 19a made of material such as rubber and this is shown as mounted upon a cylinder 19b secured to shaft 18 in any suitable manner, which shaft is journaled in the base 10. The rings 14 and 15 have extending therebetween and secured therein a pair of rods 20 disposed at diametrically opposite portions of rings 14 and 15. A segment designated generally as 21 is provided and this is provided with a flange 21a of semi-cylindrical form, which flange is arranged to fit over the rings 14 and 15. Said segment is further secured by spring hooks 22 and 23 which are oscillatably mounted on rods 24 which extend parallel to the axis of segment 21 and shaft 12 and are secured in flanges or webs 21b on segment 21, which flanges are shown in Figs. 1 and 3. Hooks 22 and 23 as shown in Fig. 3 have one of their ends bent around the rods 24 and have their free ends formed as hooks adapted to spring over rods 20. Hook 22 has secured thereto a plurality of spaced headed members or buttons 25 which project therefrom and are so disposed that when said hook is snapped over its rod 20 said buttons will be in position to hold the end of a stencil such as indicated by member 26 placed over segment 21 as shown in Fig. 3. The other end of member 26 is clamped and held in place by a member 27 comprising a rod extending longitudinally of segment 21 and hook 23 and having offset ends journaled in small lugs or brackets 28 upstanding from hook 23. Segment 21 has a wall 21c extending between the ribs 21b which is of much less thickness than the flange 21a. A chamber is thus formed in segment 21 between the ribs 15, the same having a peripheral wall formed by portion 21c. Wall 21c has extending therethrough a multiplicity of small holes or perforations 21d. The member 26 shown in Fig. 3 may be either a hectograph or duplicating printing medium.

A supplemental printing cylinder 30 is provided, the same having secured to one end a gear 31 which meshes with gear 16. Cylinder 30 revolves on a stationary shaft 32, the outer end 32a of which is of rectangular form and disposed in

a vertical slot 33a having an open upper end and formed in an upstanding bracket 33 having a base portion 33b secured to said plate 11 by the headed screws 34. There is a bracket 33 secured to each side plate 11. Said brackets 33 with the shaft 32 and other parts carried thereby thus forms an attachment which may be readily attached to side plates 11 or detached therefrom. The cylinder 30 has a wall 30a extending more than halfway therearound, which wall is shown as having extending therethrough a multiplicity of small holes or perforations 30b. Said wall has an inwardly offset unperforated extension 30c and said cylinder is completed by a cover plate 30d secured to portion 30c in any suitable manner as by screws 35. An absorbent sheet 36 is disposed adjacent the outer surface of wall 30a of the supplementary printing cylinder 30 and a hectograph or duplicating printing member 37 is placed over member 36. The ends of members 36 and 37 are held between cover 30d and portion 30c. The outer surface of member 36 and the outer surface of cover 30d form a cylindrical surface and this runs in contact with the outer surface of the member 26 on the primary printing cylinder.

A novel inking device is shown in Figs. 3 and 5 and comprises end members 38 rigidly secured to the shaft 32, said members having laterally extending portions 38a. Rollers 39 and 40 have trunnions 39a and 40a respectively journaled in the end members 38 so that said rollers are revolvable and the same are in contact. Rollers 39 and 40 may be formed with either rigid or yielding peripheral surfaces. The portions 38 and their extensions 38a form the end walls of an ink-containing chamber, the bottom of which is formed by a plate 41 extending from the upper corners of portions 38a diagonally downward into contact with the lower portion of roll 39. A plate 42 extends between portions 38a and has threaded therein a plurality of screws 43, the inner ends of which bear against the underside of a plate 41, said screws being shown as having knurled operating heads 43a. Plate 41 is somewhat flexible so that the desired engagement with roll 39 may be had at various points therealong. An ink-applying roller 44 is carried on a shaft 45 also journaled in members 38 so that said roller is revoluble and the same is in contact with the surface of roller 40. Roller 44 will be rotated by friction with the wall 30a. Roller 40 is rotated by engagement with roller 44 and roller 39 is rotated by engagement with roller 40. In Fig. 5 an ink-applying brush 46 carried on a shaft 47, journaled in member 38, takes the place of roller 44. Otherwise the structure is the same as described.

In Figs. 4 and 6 plates 50 are shown secured to the stationary shaft 32, the same having the lateral projections 50a and the widened trapezoidal lower portions 50b. The portions 50a form the end walls of an ink chamber, the bottom of which is formed by the plate 51 which is engaged by a plurality of spaced screws 52 having knurled operating heads 52a, said screws being journaled in a plate 53 connecting portions 50a. A roller 54 has trunnions journaled in members 50 and a roller 55 has trunnions journaled in members 50. Rollers 54 and 55 are in engagement and the structure thus far is similar to that already described in connection with Figs. 3 and 5. Another roller 56 has trunnions journaled in one side of portion 50b, roller 56 being in engagement with roller 55. A holder 57 is secured be-

tween portions 50b and carries a flexible distributing member or wiper 58 preferably made of rubber or fabric. Wiper 58 is adjustable in holder 57 and held in adjusted position by set screws 57a. Roller 56 may be driven by engagement with the inner side of wall 30a, or the same may be driven by a gear 61 at one end thereof meshing with a gear 62 secured to or formed on the inner side of cylinder 30. Gear 61 also meshes with a gear 60 on the end of roller 55 and gear 60 meshes with a gear on the end of roller 54. Rollers 54, 55, and 56 are thus positively driven.

The portion of the device comprising base 10, the end plates 11, rings 14 and 15 and attached parts constitute the basic structure and are substantially the same as found in the "Multigraph" machine. The segment of the "Multigraph" machine is replaced by the segment 21 described. With the machine shown in Figs. 1 to 3 the image on the hectograph or duplicating printing member 37 will be transferred to the printing medium 26 on the primary printing cylinder and will then be transferred to the paper as it passes between member 26 and platen roll 19.

The method now in use for printing hectograph prints from gelatin films is to place the paper carrying an image in hectograph ink face down on the hectograph gelatin film and let it remain there under slight pressure until the gelatin film has absorbed a considerable part of the hectograph ink. Then the paper with the remainder of the hectograph ink in the image is removed from the gelatin film. After this mass of ink has been transferred to the gelatin film in this manner, a printing process prints this ink from the gelatin film to successive sheets of paper passed over it, until the image gradually becomes too faint to make more prints. The results of this process must be first, that all the ink is not transferred from the original paper to the gelatin film and second, that the sheets of paper that take the first impressions from the gelatin film must be very heavy prints and the last impressions from the gelatin film to the paper must correspondingly be very light prints. It is therefore readily seen that with the mechanism as shown herein, the paper carrying the original image in hectograph ink will, by successive revolutions of the two cylinders, finally transfer practically all of the hectograph ink contained in the image, to the gelatin film. Also it is readily seen that while this process of transferring the ink from the original image to the gelatin film is taking place, paper passing between the gelatin film on the detachable segment and the platen will take the ink from the gelatin film to the paper in practically the same amount on each revolution as is deposited on the gelatin film from the original image. For this reason one print will not be heavier than the other, as is the case under methods of printing hectograph work now commonly used.

It is therefore evident that these two distinct advantages designated above result from printing hectograph work with the offset equipment as disclosed herein rather than with the mechanism now in common use.

With the same machine a stencil could be placed on the supplementary printing cylinder in place of the hectograph printing member 37 and a duplicating printing medium in the form of a blanket would then be placed on the peripheral surface of the detachable segment 21 instead of the gelatin hectograph printing medium. This arrangement creates an offset printing mecha-

nism for duplicating printing and this arrangement is new and has not been made use of in the methods heretofore employed. With this arrangement the improved inking device could be used. The ink from the chamber between members 33 will be taken by roll 39 and transferred or distributed onto roll 40. Roll 40 will in turn distribute the ink either to roll 44 or to brush 46 depending on which is used and the ink will then be distributed to the wall 30a. The ink will pass through the perforations 30b to the absorbent member 36 and thus be supplied to the stencil on the supplementary printing cylinder. Obviously such an inking device could also be used for a primary printing cylinder. The stencil can be placed on supplementary cylinder 30 in reverse and the paper to be printed passed between cylinder or roll 30 and segment 21, the latter having a plain rubber blanket therein and thus acting as a platen roll.

It will also be obvious that a "Mimeograph" stencil could be placed on segment 21 and stencil printing done directly on the paper passing between said stencil and platen roll 19. In this case ink would be applied to the inner wall of the segment by means now in common practice. In this case the supplementary printing cylinder would be removed from the machine by removing the brackets 33.

The basic or "Multigraph" structure already described was made to carry a detachable segment for the purpose of printing from raised surfaces. One purpose of this invention is to show a new type of detachable segment 21 for such a basic structure as has been already described. This new type of segment is constructed to print from flat instead of from raised surfaces, and therefore it must use a different method of inking these surfaces.

When this new type of segment is used to print from a stencil it requires an entirely different structure from a segment that prints from raised surfaces. The detailed construction shows the peripheral surface of this segment with a thinner wall in its center portion than at its ends. This center portion of the wall is constructed with openings through it in order that ink may pass from the inner to the outer surface of this thinner wall. Also, in order to allow the openings to extend to as near the ends as possible the webs 21b are attached to the peripheral wall only at their ends, which allows the openings to extend over the surface that would otherwise be occupied by the transverse web.

Another novel portion of this detachable segment is that the spring hooks 22 and 23 extend laterally across the width of the segment and this permits a new means of attaching the printing members or the printing mediums to the detachable segment. Longitudinally of one of these spring hooks are placed the spaced knobs or buttons 25 and a lateral bar on a pivot that acts as a clamp is mounted on the other spring hook. These knobs or buttons and the lateral bar form means for attaching the members or mediums to the segment and these means are turned into the proper position when the detachable segment is attached to the rings, but they are turned back out of the way in the center of the segment when the segment is detached and not in use. Also these spring hooks on the segment attach to two separate bars extending between the rings 14 and 15 and not to the center shaft or axis, because under some conditions, it is necessary that the central shaft be non-rotating. The non-rotating

shaft is an essential factor in the new inking device, for duplicating printing, which is described and shown in the drawings and specifications herewith. This new inking device may be used on either a cylinder acting as a primary or a supplementary cylinder but the cylinder preferably should have a non-rotating shaft to which the inking device is attached. With duplicating printing, ink must be spread on the inner wall of the segment or cylinder which has openings through the peripheral wall, and then this ink must be forced through the openings to the absorbent sheet and overlying stencil that are on the outer peripheral wall. In order to do this the inking device as shown has an inking roller that may be made to advantage of brush construction. This roller or brush is mounted on the non-rotating shaft and contacts the inner peripheral wall on a lateral line that corresponds on this inner wall to the line contacted by the platen on the outer wall of the cylinder or segment. Another variation shows the pliable scraper or spreader 58, preferably of rubber that follows the roller and forces the ink through the openings. The customary method of inking as used on the duplicating machine forces the ink into the absorbent sheet until it is thoroughly saturated and then no more ink is added to the absorbent sheet until the printing begins to run too light and then the inking operation is repeated.

It is easily understood that the inking device as shown herewith feeds ink into the absorbent sheet continuously and this flow of ink can be regulated as shown by the set screws on the ink fountain or can be turned off completely. It also can be regulated to feed little or no ink on one portion of the absorbent sheet and a greater amount on another portion. This is readily seen to be a distinct advantage as not only an even and an adjustable flow of ink is obtained but also there is no need of a separate operation to ink the machine after the printing is once started.

The advantage gained by being able to print several different types of printing on one small machine is probably the greatest advantage gained by this printing equipment. Several of these methods of printing are new.

By providing the attachment of the supplementary cylinder and printing members used therein and by providing the novel segment for the primary cylinder, a printing device is formed which will do various kinds of work. These kinds of work can now only be done by having several machines some of which are large and very expensive.

What is claimed is:

1. In a machine of the class described, the combination of a rotary platen, a primary printing cylinder, a detachable segment carried by said cylinder and having a peripheral surface adapted to receive interchangeable printing mediums for different methods of printing, means for removably attaching any one of said printing mediums to said peripheral surface, a supplementary printing cylinder of the same diameter as the primary printing cylinder removably secured adjacent to said primary printing cylinder, means for rotating said cylinders in contact with each other and at the same speed, said supplementary printing cylinder having a peripheral surface adapted to receive interchangeable printing members for different methods of printing, and means for removably attaching any

one of said members to said last mentioned peripheral surface.

2. In a machine of the class described, the combination of a rotary platen, a primary printing cylinder, a segment removably attached to said cylinder, spring hooks carried by said cylinder for securing the same to said cylinder, said segment having a peripheral surface adapted to receive interchangeable printing mediums for different methods of printing, means on said spring hooks for removably attaching any one of said printing mediums to the said peripheral surface, a supplementary printing cylinder of the same diameter as the said primary printing cylinder, removably secured adjacent to said primary printing cylinder, means for rotating said cylinders in contact with each other and at the same speed, said supplementary printing cylinder having a peripheral surface adapted to receive interchangeable printing members for different methods of printing, and means for removably attaching any one of said printing members to said last mentioned peripheral surface.

3. In a machine of the class described, the combination of a rotary platen, a primary printing cylinder, a detachable segment carried by said cylinder having a peripheral surface, a duplicating printing medium, means for removably attaching said medium to said peripheral surface, a supplementary printing cylinder, the same being hollow and having a perforated peripheral wall, means for rotating said cylinders in contact with each other and at the same speed, a stencil on the peripheral surface of said supplementary cylinder and means for inking said stencil.

4. In a machine of the class described, the combination of a frame, a primary printing cylinder having a peripheral surface, a hectograph printing medium on said peripheral surface, a supplementary printing cylinder secured to said frame adjacent to said primary printing cylinder, means for rotating said cylinders in contact with each other and at the same speed, said supplementary printing cylinder having a peripheral surface adapted to receive any one of a number of interchangeable printing members carrying images in hectograph ink, and means for securing one of said printing members to said peripheral surface.

5. A segment adapted to be detachably secured to the rotating spaced rings of a "multigraph" machine comprising a peripheral wall having a multiplicity of perforations therethrough and having a smooth peripheral surface, spring hooks extending across said segment one of which has thereon a plurality of spaced buttons for holding a printing member thereon.

6. In combination with the rotating cylinder of a machine of the "Multigraph" type having spaced rods extending thereacross parallel to its axis, of a segment adapted to be secured to said cylinder, spring hooks extending thereacross adapted to engage over said rods respectively, said segment having a peripheral wall with a multiplicity of perforations therethrough, said spring hooks having means for respectively holding the ends of a printing member extending around the outer side of said segment.

7. In a printing couple, the combination of a rotary platen, spaced rings mounted on a revolvable shaft, a segment removably carried by said rings, said segment having a peripheral surface adapted to receive interchangeable members of sheet material for different methods of printing,

ing and having openings through its peripheral surface through which openings ink can pass from the inner concave side thereof to the outer convex side of said segment, an absorbent sheet of material covering the openings on the outer convex side of said segment and a stencil contacting the exposed surface of said absorbent sheet.

8. In a printing couple, the combination of a rotary platen, rings mounted on a revoluble shaft, a segment removably carried by said rings, spring hooks securing said segment to said rings, said segment having a peripheral surface adapted to receive interchangeable members of sheet material for different methods of printing and having openings through its peripheral surface through which openings ink can pass from the inner concave side thereof to the outer convex side of said segment and means on the said spring hooks for removably attaching any one of said members to the said segment.

9. An attachment for a printing machine of the "Multigraph" type having a frame and spaced rings rotatably mounted therein, comprising a segment having means for securing the same to said rings and means for holding a sheet on the outer surface of said segment, brackets secured to said frame supporting a shaft and a supplementary cylinder rotatable about said shaft adapted to carry a printing member cooperating with said sheet in the rotation of said segment and cylinder.

10. An attachment for a printing machine of the "Multigraph" type having a frame, a platen roll therein, and a cylinder rotatably mounted in said frame and comprising a segment having a peripheral wall with a comparatively smooth removable outer surface, a sheet secured to said segment constituting a printing medium, brackets secured to said frame, a shaft carried by said brackets and a supplementary printing cylinder rotatable on said shaft having a perforated peripheral wall with a comparatively smooth outer surface adapted to receive a printing member to cooperate with said sheet.

11. A segment adapted to be detachably secured to the spaced rings of a "Multigraph" machine comprising spaced circumferential flanges and a perforated peripheral wall extending between said flanges having a comparatively smooth outer surface.

12. In combination with the spaced rings of a "Multigraph" machine having spaced rods extending therebetween parallel to their axis, of a segment adapted to be secured to said rings having spring hooks extending thereacross adapted to engage over said rods respectively, said segment having circumferentially extending flanges and a perforated peripheral wall between said flanges.

13. In a machine of the class described, the

combination of a rotary platen, spaced rings mounted on a revoluble shaft, a segment removably carried by said rings, spring hooks carried by said segment for securing the same to said rings, said segment having a peripheral surface adapted to receive interchangeable printing mediums for different methods of printing, means on said spring hooks for removably attaching any one of said printing mediums to the said peripheral surface, a removably attached supplementary printing cylinder, means for rotating said supplementary printing cylinder and said segment carried by said rings in contact with each other, and at the same speed, said supplementary printing cylinder having a peripheral surface adapted to receive interchangeable printing members for different methods of printing, and means for removably attaching any one of said printing members to said last mentioned peripheral surface.

14. A machine of the class described, having in combination, a frame, a rotary platen, a revoluble shaft mounted on said frame, spaced rings secured to said shaft, a segment removably carried by said rings and having a peripheral surface, a duplicating printing medium, means for removably attaching said medium to said peripheral surface, a supplementary printing cylinder having a peripheral surface and having openings through its peripheral surface through which openings ink can pass from the inner concave side thereof to the outer convex side of said surface, means for rotating said supplementary printing cylinder and said segment carried by said rings in contact with each other and at the same speed, a stencil on said peripheral surface of said supplementary cylinder and means for inking said stencil.

15. In a machine of the class described, the combination of a frame, a platen roll therein, a cylinder rotatably mounted in said frame and comprising a segment having a peripheral wall with a comparatively smooth outer surface, a hectograph printing medium on said outer surface, a supplementary printing cylinder secured to said frame adjacent to said cylinder rotatably mounted therein, means for rotating said cylinders in contact with each other and at the same speed, said supplementary printing cylinder having a peripheral surface adapted to receive any one of a number of interchangeable printing members carrying images in hectograph ink, and means for securing any one of said printing members to said peripheral surface.

16. A segment adapted to be detachably secured to the spaced rings of a "Multigraph" machine comprising spaced circumferential flanges and a perforated peripheral wall extending between said flanges, said segment having a comparatively smooth outer surface and a resilient means for holding said segment in place on said machine.

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