

Dec. 9, 1930.

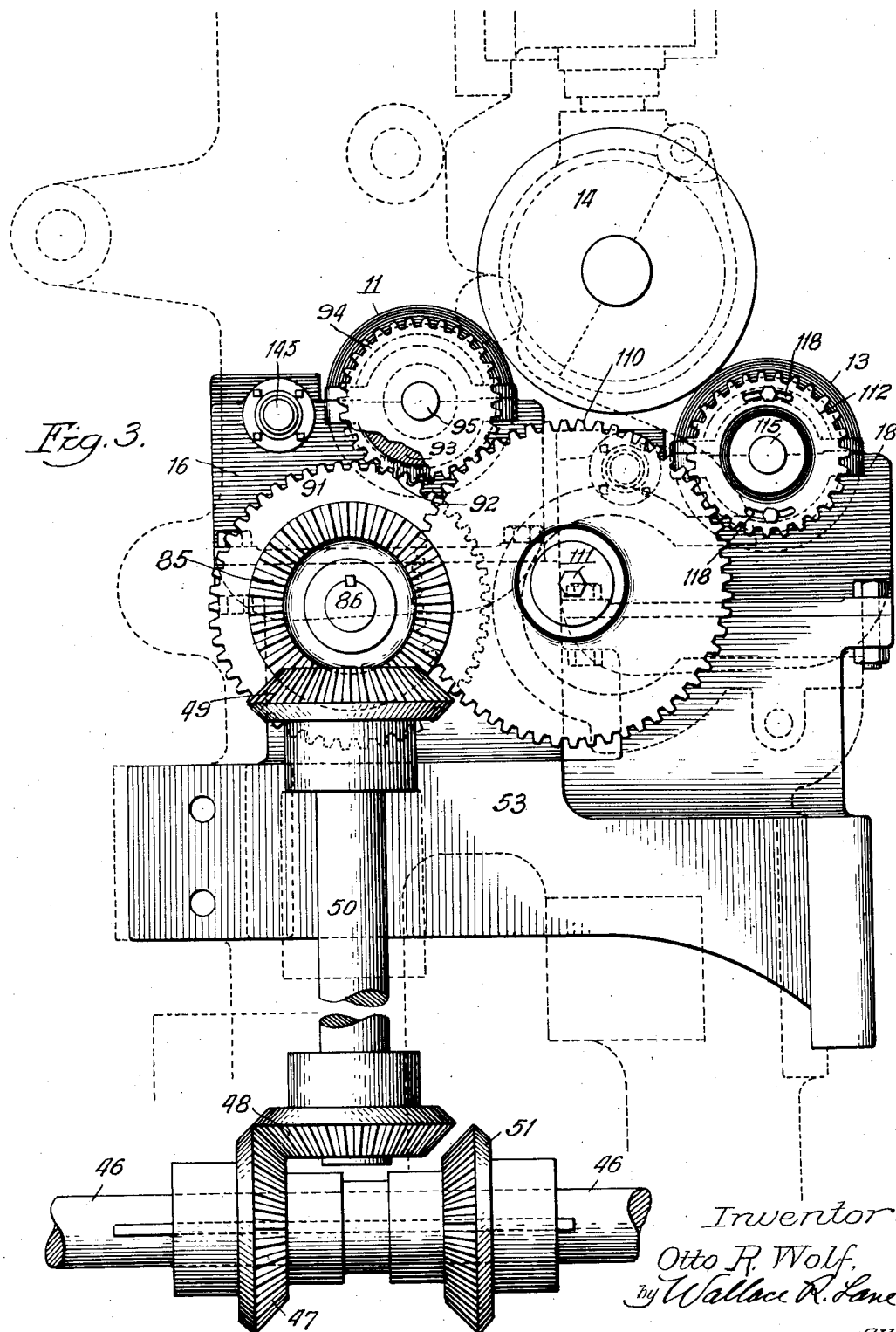
O. R. WOLF

1,784,037

PRINTING PRESS

Filed Dec. 5, 1925

8 Sheets-Sheet 2



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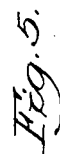
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8 Sheets-Sheet 3



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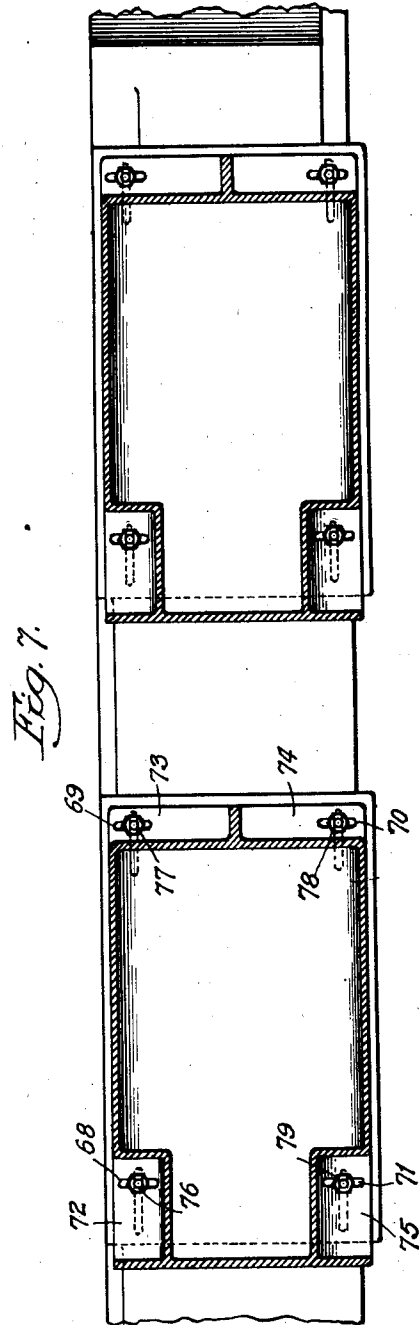
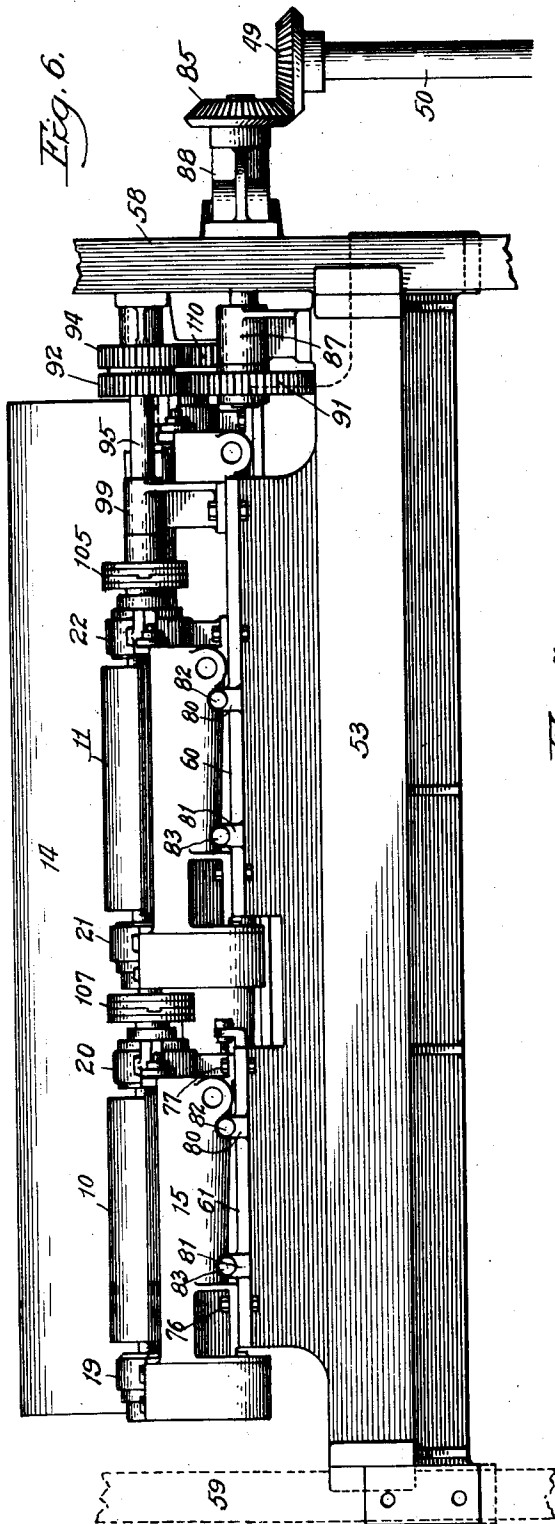
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8 Sheets-Sheet 4



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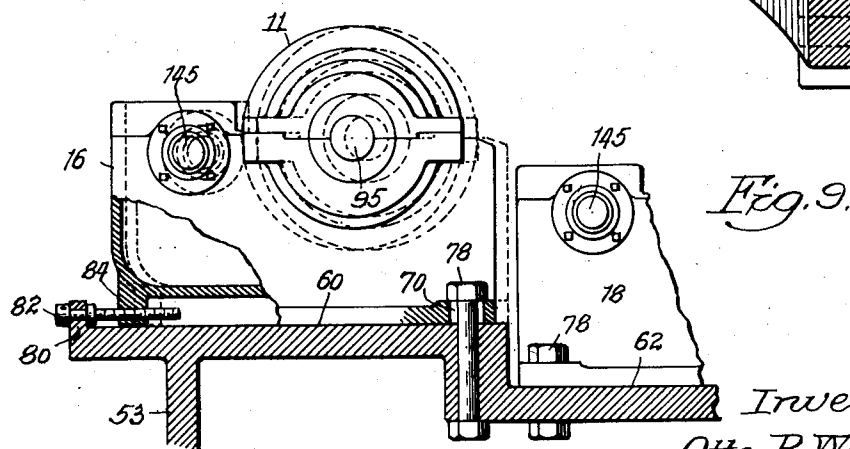
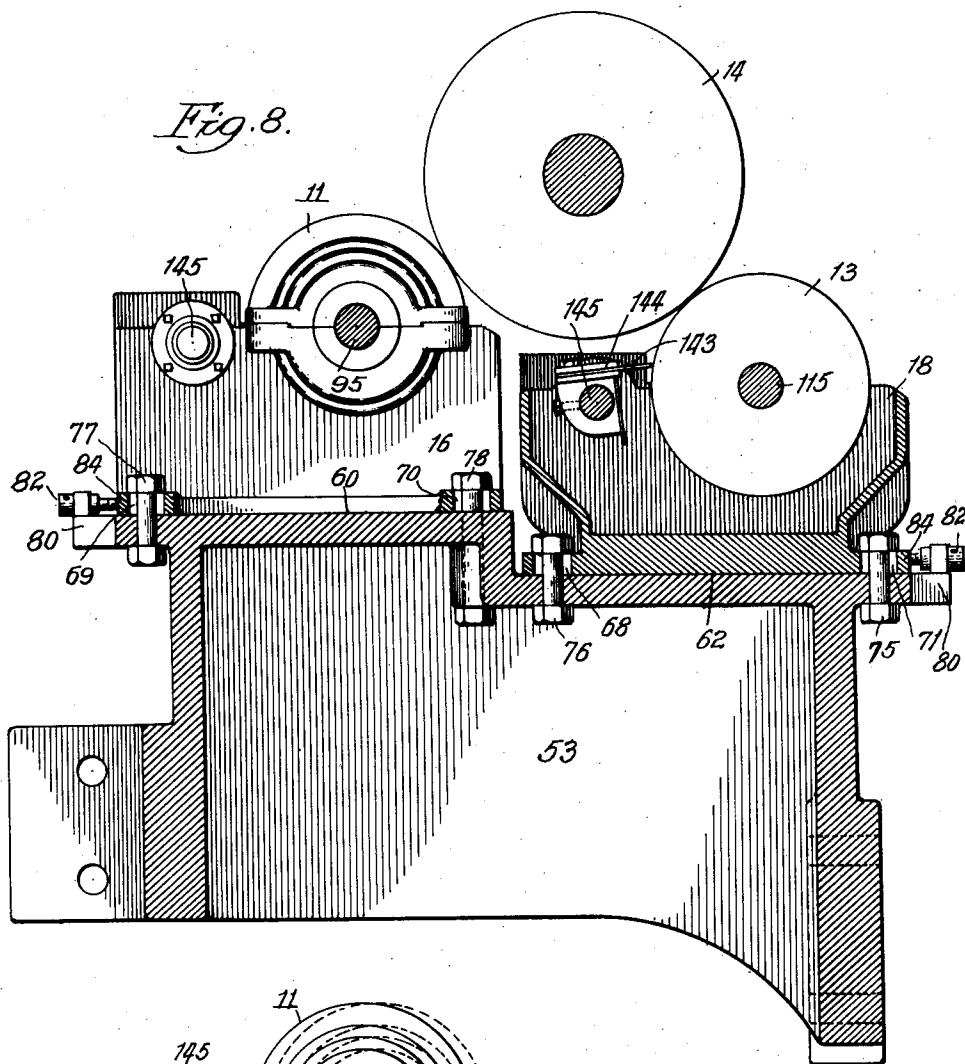
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8 Sheets-Sheet 5



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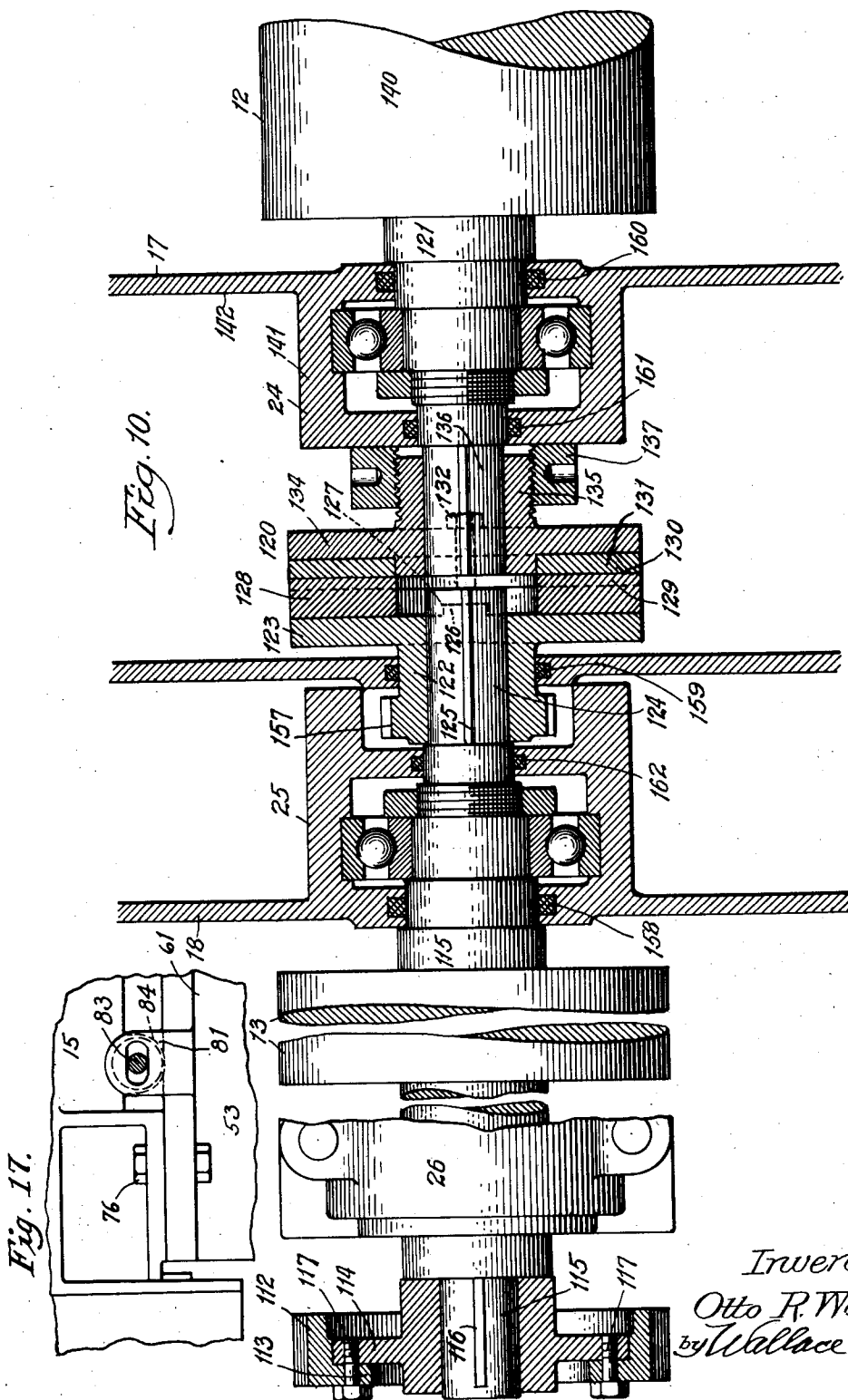
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8 Sheets-Sheet 6



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8 Sheets-Sheet 7

Fig. 11.

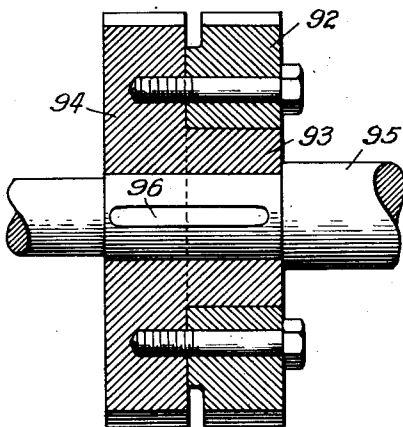


Fig. 12.

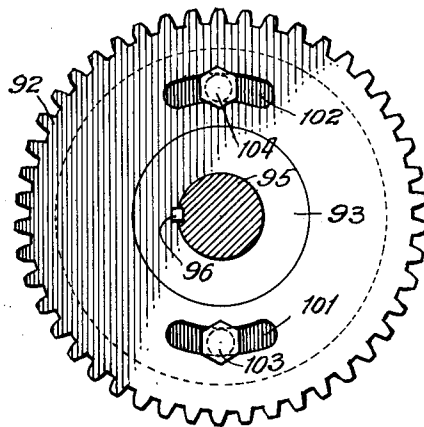


Fig. 13.

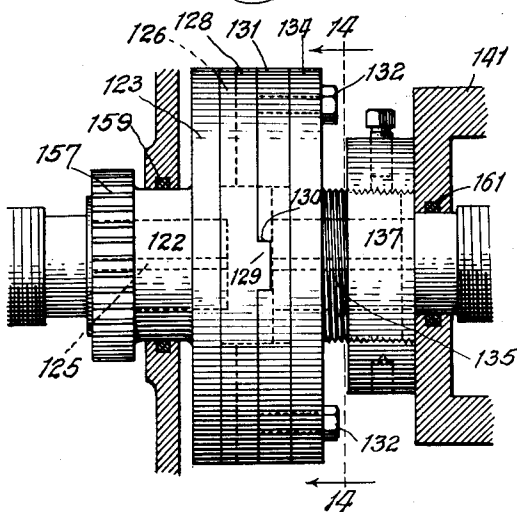
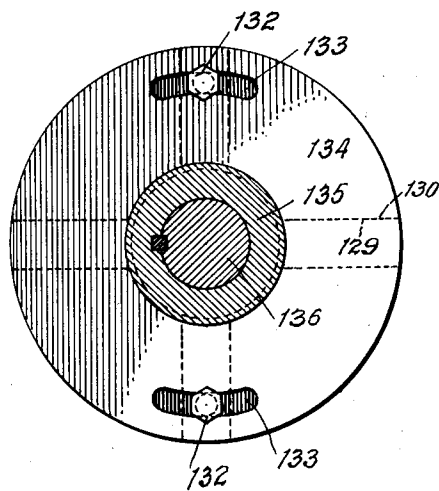


Fig. 14.



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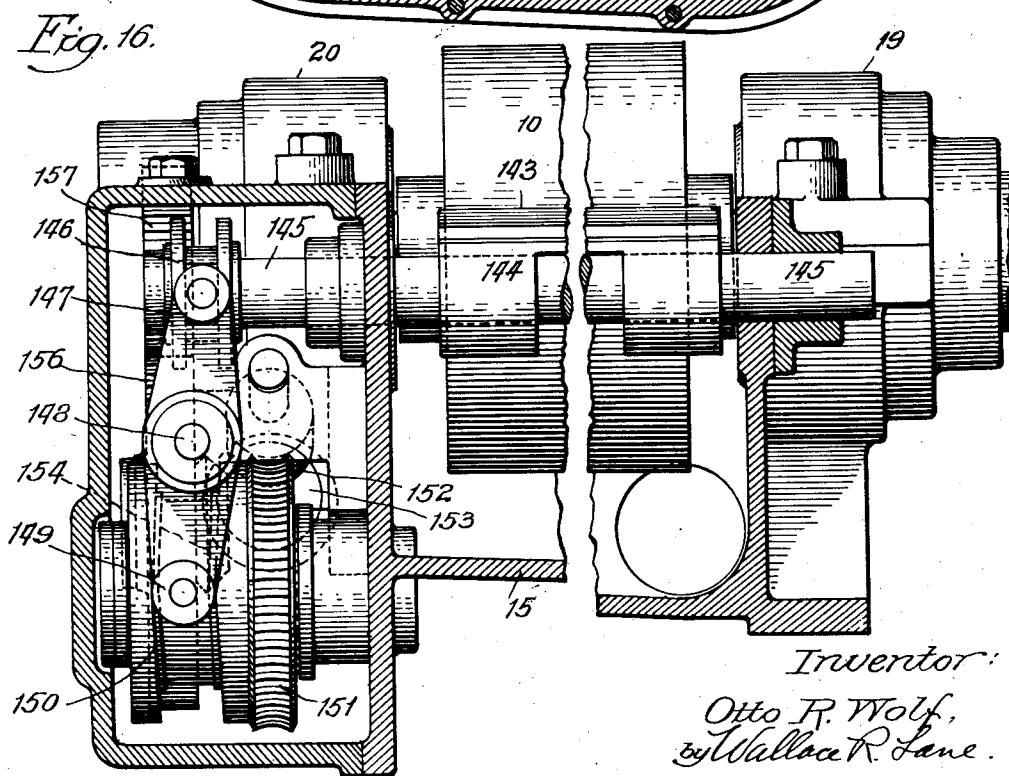
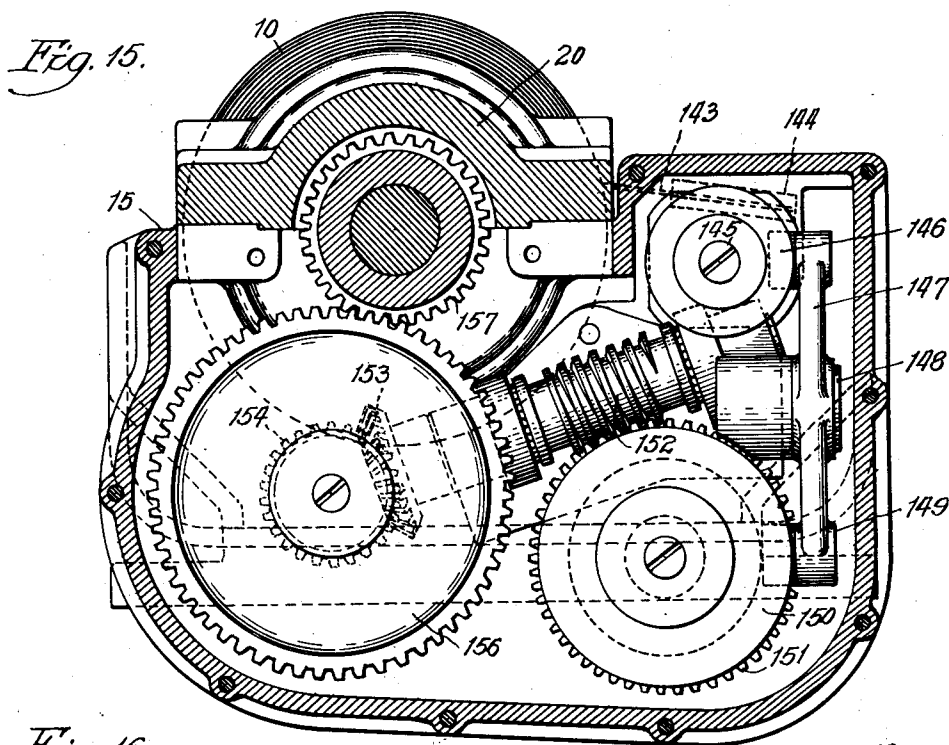
O. R. WOLF

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE

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PRINTING PRESS

Application filed December 5, 1925. Serial No. 73,487.

The present invention relates to printing and more particularly to the printing of composite impressions, such as color work and the like.

5 Among the objects of the invention is to effect a correct registering of the component parts of the composite impression or picture by an independent or separate adjustment or correction of the component impression; 10 wherever such impression is being made in the printing device or press. This enables the printing of several separately controlled or corrected impressions across the width of the web, the latter being preferably a wide 15 web.

Where several picture parts or components are etched upon a single cylinder, the length of which corresponds to the width of the web, it is practically impossible to so locate the 20 etched parts as to correspond correctly with the correlative components of a preceding or succeeding printing cylinder. Some of the components of one cylinder might be correctly located for the impressions made thereby to match exactly with the impressions of a 25 preceding or succeeding cylinder, while the remaining components might be not so located. If the cylinder were adjusted to make the latter match up correctly, it meant the throwing out of matching correlation of the others. 30 The locating of the components upon the cylinder depends upon the skill of the worker or workman. It is practically impossible for even the most skilled workman to accurately 35 locate the components. Moreover, many other factors enter into the process to vary the conditions contributing for or against the desired result, such as variations in the characteristics of the paper or transfer, such as the 40 gelatine pigment paper, or the like, when making the etching; also the variations in the characteristics of the web upon which the impressions are made, such characteristics changing with the temperature, humidity, 45 tautness and the like, while passing thru the press. The present invention, therefore, comprehends the idea of eliminating the necessity of accurate placing or locating of the transfer on the cylinder to be etched or otherwise 50 similarly treated for effecting the com-

ponent impression on the web. It also avoids loss in cylinders, that is to say, in the present invention, the cylinder can be used in the press, notwithstanding the fact that the etchings are not accurately located, whereas heretofore such a cylinder could not be used and was discarded and reground to remove the etchings so that the cylinder could later be used for further etching thereon. In this way, there is not only a saving in materials and the cost thereof, but also a saving in time and labor, by the present invention.

In color press work for producing colored pictures, two or three colors, each of a single shade or tint, are used together with the color 65 usually black, for the printing of the titles, descriptions and the like. Sometimes, the overlapping of two primary colors, such as blue and yellow, would produce a third color, such as green, but if shades and tints were 70 desired, the means was not adapted to such results. In this invention, this is made possible by the provision of independent printing cylinders and color fountains or troughs for each component impression to be made 75 such that in a printing unit designated to a color, such as red, the fountains of that unit may have different shades of red ink, such as pink, carmine, vermillion etc. Similarly in the yellow unit, different yellow colors, such 80 as orange, canary, chrome, etc. may be had, similarly in the blue unit. Any number of combinations may thus be used to produce colored pictures, which are truer to natural or original color than heretofore possible. 85

Accordingly, the present invention includes the idea of providing means adapted to obtain the above mentioned results and more specifically includes the provision of a plurality of independent printing sections 90 or sub-units in a printing unit, usually termed a couple, altho in this case, instead of being but a couple (printing cylinder and impression roller) each unit comprises a number of short printing cylinders, preferably 95 arranged in groups or ranks of two or more cylinders in each rank and with the cylinders of one rank alternating or being in staggered relation with the cylinders of the adjacent rank. Each sub-unit preferably has 100

a short printing cylinder and also preferably is rotatably supported by the ink fountain for that cylinder, each cylinder having a fountain independent of the fountains of the other cylinders. The fountain may have integral or rigid bearing portions for the cylinder. A separate scraper or knife, preferably carried by the fountain may also be provided for each cylinder, the fountain preferably having means, such as a compartment, or the like, for housing the operating means for actuating the scraper, the driving means for the cylinder preferably actuating each operating mechanism. By mounting the cylinder and the scraper upon the fountain, the scraper is maintained in fixed relation to the cylinder irrespective of the movement or position of the cylinder when adjusted for any of the purposes herein mentioned.

Another object of the invention is to provide novel means for adjusting each section and each cylinder independently of the other sections and cylinders. Inasmuch as a section comprises as a unit, a fountain, a cylinder with its bearings, and a scraper with its means for operating it, the section is made adjustable, as a unit, upon a support forming part of the frame of the printing press or multiple. Such an adjustment, specifically, may be had by providing slots in the support and arranged parallel to the axes of the cylinders, and slots in the fountain, such as flanges thereof, transverse to the previously mentioned slots and transverse to said axes of the cylinders, and bolts passing thru such slots whereby the sub-unit or section can be adjusted or moved, within the limits of the slots, axially and transversely or radially of the cylinder axes, and the bolts tightened to secure the sections in adjusted position or relation. If an impression component be to one side of the component used as a guide or key and by which adjustment is to be made for proper matching or registering, the adjustment is made axially for correct aligning of the correlative components. If the impression is too light or too thick, the transverse or radial adjustment may be had to correct that, this being effected by increasing or decreasing the pressure between the printing cylinder and the impression roll or cylinder.

A further object of the invention is to provide driving means with adjustable means for properly driving the cylinders in proper time relation and to correct forward or rear displacement of a component impression with respect to correlative impression of the same picture or composite impression. Preferably, a common and reversible drive is used for the whole press or multiple, and a novel drive branching therefrom for each printing unit. From this, preferably, are provided further branch drives to the cylinders. These drives preferably have adjustable con-

nections and couplings such that an adjustment may be effected in all the sections simultaneously or as a unit, or in one part or another, independently, such as a forward or rear rank of cylinders, of the sections, or in each cylinder independently and separately of the other cylinders. When adjusting the unit, adjustably connected drive members, such as gears or the like, may be adjusted and secured in adjusted relation. When adjusting a rank of cylinders, a similar adjustment of driving members may be made, or the adjustment may be made by way of an adjustable coupling. When adjusting a single cylinder with reference to the others, such adjustment may be made also by a coupling connection in the drive to such cylinder. These adjustments effect angular or rotative advance or retard in the particular cylinder being adjusted. Thus, if a component impression should be ahead or behind the guiding or key impression, the cylinder may be angularly adjusted to correct for this and cause the impressions to match or register in the final or composite picture.

The invention also comprehends novel driving and coupling features, having means for permitting the rotation of a cylinder on an axis not coaxial with the axis of another cylinder, and thru which the driving of the former may be derived, and also means for effecting an angular adjustment of a cylinder about its axis. Means may also be included to take up any loose play caused by an adjustment, such as an axial adjustment of a cylinder, and to maintain the adjusted relation of such cylinder. In a specific form, the coupling may comprise a member secured to a driving shaft and engaging a power and action-transmitting means by way of engaging and slidable tongues and grooves arranged in transversed planes to permit the non-coaxial operation of two or more cylinders, and adjustable means connected to a driven shaft for permitting the angular adjustment of the latter shaft, which may carry a printing cylinder. The member connected to this shaft may also carry a thrust member which may be adjusted to maintain the cylinders in adjusted axial condition or relation.

The invention also comprehends other features, advantages, capabilities and objects which will later appear and are inherently possessed by the invention.

Referring to the drawings, Fig. 1 is a schematic and conventional view of a printing press embodying the invention;

Fig. 2 is a fragmentary schematic and plan view of the same;

Fig. 3 is a view in elevation of a printing unit constructed in accordance with the invention;

Fig. 4 is a top plan view of the unit with parts shown in sections;

Fig. 5 is a top plan view of the base of the unit;

Fig. 6 is a view in side elevation of the unit;

Fig. 7 is a horizontal sectional view taken thru a part of a unit;

Fig. 8 is a vertical transverse sectional view of the unit;

Fig. 9 is a fragmentary vertical transverse sectional view of a part of the unit;

Fig. 10 is a part top plan and a part horizontal sectional view of the driving features of the unit;

Fig. 11 is a sectional view of an adjustable driving part;

Fig. 12 is an end view of the same showing the shaft in section;

Fig. 13 is a plan view with parts in section, of a coupling feature in the unit;

Fig. 14 is a transverse sectional view of the same taken in plane represented by line 14—14 in Fig. 13 of the drawings;

Fig. 15 is a transverse sectional view of the mechanism for operating the scraper;

Fig. 16 is a side view of the same with parts in section or broken; and

Fig. 17 is a detail view showing the means for adjustment of the ink fountains in direction parallel to the axes of the printing cylinders.

Referring now in more detail to the drawings, the embodiment selected to illustrate the invention is shown as a printing press of the multiple unit type and in which is travelling a paper web 1, being supplied from a suitable supply, and passing over a suitable guide 2, and between a printing cylinder 3 and an impression roller 4, and then to guide 5 and to a heating or drying drum 6, and then over and through guides 7 and 8, and to the next couple or first color unit of the press. The printing cylinder 3 may have a suitable ink fountain 9, for supplying ink, through suitable means, to the printing cylinder 3. In this unit, the printing cylinder is intended to print on the opposite side of the web from that upon which the color impressions are to be imposed.

The web then proceeds to the first color unit comprising a plurality of printing cylinders 10, 11, 12 and 13 and an impression cylinder or roll 14 adapted to be contacted by the printing cylinders just mentioned. Each printing cylinder 10, 11, 12, or 13 has a separate and independent inking trough or fountain, 15, 16, 17 and 18, in which may be contained the ink of the desired color. The fountains each have or carry bearings 19 and 20 for the cylinder 10, 21 and 22 for cylinder 11, 23 and 24 for cylinder 12, and 25 and 26 for cylinder 13. It will thus be seen that the fountain together with the cylinder and bearings, therefore, each constitute a single unitary device or printing section of the color units. In the case of the first unit of the multiple, the color yellow may be used for printing. The

inks in the various fountains may be different shades or tints of yellow, as for example, one fountain may have the usual yellow color, another fountain may have a light yellow or canary yellow, another fountain may have a darker yellow or chrome and the other fountain may have a color similar to orange. It is to be understood that these are only illustrative examples and that other shades and tints may be used, and that the number of printings, cylinders and fountains in use may be that desired.

The web 1 will thus proceed thru the first unit over guides 27 and between the impression roller 14 and the printing cylinders 10, 11, 12 and 13 and pass over guides 28 to the heating cylinder 29 and thence over guides 30, 31, 32, 33 and 34 to the next color unit, the web then proceeding thru this unit as in the unit just described.

The second and succeeding color units are identical with the first unit described, but makes use of different colors of inks. In the second color unit, the color may be of the red and the shades and tints thereof. In the third color unit, the color may be of the blue and the shades and tints thereof.

After the web passes from the third color unit, it may then pass through a printing unit for printing in black or the like, as desired. The web thus passes over guides 35 and in and between printing cylinders 36 and impression cylinder 37, the printing cylinder 36 having a suitable inking fountain 38. The web will then pass over the guides 39 and heating drum 40 and pass over guides 41, 42, 43, 44 and 45 to suitable means for cutting and folding the paper web into the forms desired. The unit for printing the black, is intended for printing titles, descriptions and the like upon the web in association with the color impressions or composites produced thereon. The cylinder 36 may be of the full width of the web instead of being composed of a plurality of short printing cylinders as in the color units.

The various units may be driven from a common driving shaft 46, located at one side of the multiple and operating through suitable gears 47 and 48, to a driving shaft 50 driving through gear 49 to the unit for driving the parts thereof. The common shaft 46 may also have suitable gears 51 and suitable shifting means for effecting reverse operation through the gears 51, 48, shaft 50, and gear 49, the gear 47 being suitably associated with the shifting means to be thrown out of mesh with the gear 48 when the gear 51 is thrown into mesh. When operating with a reverse drive, the sub-units may be reversed end for end upon their supports. This may be desirable to cause certain of the sub-units to print on the reverse side of the web. Inasmuch as the shifting mechanism and reversing means is not regarded as a particular part

of the invention, further disclosure thereof is omitted.

Each printing unit is supported upon a supporting member 53 suitably secured as by bolts 54, 55, 56 and 57, to the side frame members 58 and 59 of the press or multiple. The support 53 has suitable machined surfaces or bases 60, 61, 62 and 63 for respectively supporting fountains 16, 15, 18 and 17, as clearly shown in Figures 4 and 5 of the drawings. Each base is provided with a plurality of longitudinal slots 64, 65, 66 and 67 for the purpose of permitting longitudinal adjustment of the fountain with relation to its respective base within the limits of the lengths of the slots just mentioned, these slots being located to cooperate with transverse slots 68, 69, 70 and 71 formed in flanged portions 72, 73, 74 and 75 of the fountain, as clearly shown in Fig. 7 of the drawings. Through the cooperating slots may pass suitable securing elements, such as bolts and nuts 76, 77, 78 and 79 respectively. From this, it will be apparent that the fountain may be adjusted lengthwise thereof or, in other words, axially of the cylinder carried by the fountain, within the limits of the lengths of the slots 64, 65, 66 and 67, and also the fountain may be adjusted transverse to the axis of the cylinder carried by the fountain to the extent of the lengths of the slots 68, 69, 70 and 71.

For the purpose of effecting the transverse adjustment of the fountain, the supporting base may be provided with laterally extending bracket portions 80 and 81 in which are rotatably supported adjusting screws 82 and 93 suitably associated with a side portion 84 of the fountain, such that when the screw is turned in one or the other direction, the fountain may be moved transversely forward or backward with respect to the axis of the shaft or cylinder carried by the fountain. The brackets 80 and 81 may be suitably slotted to permit adjustment of the fountain in direction parallel to the axis of the cylinder. While this description has been made with reference to a fountain and cylinder, it is to be understood that the other sections are of similar or identical construction. When referring to Figs. 4 and 8, it will be noted that cylinders 11 and 10 are arranged in line and are alternated or staggered with cylinders 13 and 12 arranged in another line or rank.

The lateral adjustment of the printing cylinders by way of the screws 82 and 83 is for increasing or decreasing the pressure of the cylinders with the impression roller 14 so as to produce a more distinct or less heavy impression as desired. The lateral or radial movement of the sub-unit or section is clearly shown by the full line and dotted line positions of the unit in Fig. 9 of the drawings.

As previously stated, the unit is operated by a common shaft 46 operating through either gear 47 or 51, depending upon the di-

rection of rotation desired, and through gear 48, vertical shaft 50, gear 49. The latter gear is in mesh with the gear 85 secured to a shaft 86 supported in suitable bearings 87 and 88, of which the former is secured to and supported by the supporting member 53, as by means of bolts 89, and the latter being secured to the frame portion 58 by way of bolts 90, as clearly shown in Fig. 4 of the drawings. The inner end of the shaft 86 has secured thereto a spur gear 91 in mesh with a gear 92 (see Figs. 11 and 12) in the form of a ring and rotatably supported upon hub 93 of a gear 94 secured to a shaft 95 by way of a key or the like 96, the shaft 95 being supported in a bearing 97 secured to the frame portion 58 by means of bolts 98, and in a bearing 99 suitably supported upon the base 60 and secured thereto by bolts 100. The gear 92, as above indicated, is rotatably mounted on the hub 93, so that the latter may rotate relative to the gear 92 for the purpose of adjustment. This adjustment may be effected by reason of the gear 92 being provided with arc shaped slots 101 and 102 through which extends securing bolts 103 and 104, which are threaded to be secured into the gear 94. When it is desired to adjust the angular position of the cylinders driven by the shaft 95, the bolts 103 and 104 may be loosened and the gear 94 with the shaft 95 and connected parts may be moved to the desired angular extent, and within the range of the lengths of the slots 101 and 102, and then the bolts 103 and 104 may again be tightened so as to secure the gear 92 rigidly with the gear 94 so that the two will operate together in unison or as a single unitary driving member.

The portion of the shaft 95 passing through the bearing 100 extends through a coupling mechanism 105 coupled to shaft 106 forming the shaft for the cylinder 11, this shaft having bearings 21 and 22 carried by and forming a part of the fountain 16. The other end of the shaft 106 extends beyond the bearing 21 and is connected to a coupling mechanism or device 107 coupled to an end of a shaft 108 rotatably supported in the bearings 19 and 20 of the cylinder 10, forming the shaft for such cylinder. It will thus be seen that the driving means for these two cylinders are in line, or substantially so, with the exception of the variation as will be later explained in connection with Fig. 10 of the drawings. The cylinders 10 and 11 are in rank and driven by the shaft 95 through the couplings 105 and 107 and the shafts of the cylinders.

The above is the description of the drive for the front cylinders. For effecting a drive through the back cylinders, 13 and 12, the gear 94, which is secured to the shaft 95, is in mesh with a gear 110 rotatably carried upon a stud shaft 111 suitably supported in the frame portion 58, as clearly shown in Fig.

4 of the drawings. The gear 110, in turn, is in mesh with gear 112 which is in the form of a ring and has a flange 113 (see Fig. 10 of the drawings) secured to a flanged head 114 carried by and secured to a shaft 115 by way of a key 116. The flanges 113 and 114 are secured together by securing bolts 117 threaded into the flange 114, the bolts 117 passing through arc slots 118 formed in the flange 113. By this construction, it will be apparent that the head 114 may be, when the bolts 117 are loosened, turned angularly within the limits of the lengths of their slots 118, so as to adjust the shaft 115 angularly with respect to the gear 112 when it is desired to angularly adjust the cylinders 13 and 12. The shaft 115 carries the cylinder 13 and has bearings 25 and 26 carried by or forming a part of the fountain 18. The other end of this shaft is connected to a coupling means 120 coupled to a shaft 121 of the cylinder 12 and rotatably supported in bearings 23 and 24 carried by or forming a part of the fountain 17. As in the case of the front cylinders, the cylinders 13 and 12 are substantially in line and operated by the shaft 115 through the gear 112. The angular movement of these gears with respect to the others, may be effected by the adjustment means or connection between the flanges 113 and 114. The extent of radial and axial adjustment of the cylinders 11 and 13 required in practice will ordinarily not be greater than that permitted by the normal relationship of the driving gears, which may have a certain amount of relative movement without interfering with the drive.

From the above, it will be apparent that the whole set of printing sections may be adjusted by the turning of the shaft 95 and the gear carried thereby relative to the gear 92 as previously described. If it be desired to set or adjust two printing cylinders, such as the front cylinders 11 and 10, the adjustment is made by means of the clutch mechanism 105, which will be later described in detail in connection with Fig. 10. If it be desired to adjust the two cylinders 13 and 12 together, the adjustment is made by adjusting the head 114 with the shaft 115 relative to the gear 112. If it be desired to adjust the single cylinder 10 without disturbing the others, the adjustment is made through the clutch mechanism 107. Similarly, the adjustment of the single cylinder 12 may be made through the clutch mechanism 120. The clutch mechanisms 105, 107 and 120 are of identical construction and shown, by way of illustration, in Fig. 10 of the drawing.

Such clutch mechanism comprises a driving member 122, having a plate 123 and a hub portion secured to the shaft end portion 124 by means of a key 125. The plate is provided with a radial tongue or projection 126 fitting into a radial groove 127 provided in the face of a coupling ring 128. The latter has a ra-

dial tongue 129 arranged in a plane at right angles to the plane of the tongue 126. The tongue 129 fits into radial groove 130 provided in an auxiliary ring 131. The ring 131 has secured thereto a plurality of bolts 132 extending through arc-shaped slots formed in a plate portion 134 of a driven clutch member 135, the latter being secured to end shaft portion 136 of a shaft of one of the cylinders. The hub portion of member 135 is threaded to receive a thrust nut 137 adapted to be operated by a spanner wrench. When it is desired to adjust the cylinder, such as cylinder 140, which may correspond to any one of the small cylinders shown, such as cylinders 11, 10 or 12, the securing bolts 132 are loosened and the shaft 136 together with the cylinder 140 and the driven member 134 are turned to the desired angular amount, depending upon the lengths of the slots 133, and then the bolts 132 again tightened. If the axes of the cylinders of a rank, such as cylinders 11 and 10 or cylinders 13 and 12 are out of co-axial alignment, the tongues and grooves of the coupling will have a radial sliding effect as one part of the coupling drives the other part so that one shaft is operating upon an axis parallel to, but not co-axial with the axis of the other shaft. Also the axis of one shaft might be slightly at an angle with another shaft and yet the clutch will properly operate. In this way, adjustment of one of the printing sections with reference to the other may be made transverse to the axis of the printing cylinder so as to obtain the proper pressure with the impression roller without effecting the driving of one cylinder from the other by way of the clutch mechanism. On the other hand, if a printing cylinder and its section be adjusted axially so as to make an impression register properly with the key impression, such adjustment is made by moving the sub-unit or section, as previously described, such that a greater or less space will be provided between the member 135 and the bearing supporting portion 141 forming a part of an end wall 142 of an inking fountain. If we assume that the adjustment of the section with the cylinder 140 is to the right as shown in Fig. 10 of the drawing, a space will be presented between the member 135 and the bearing supporting member 141. The nut 137 may then be turned so that it will contact with the member 141 so as to be in thrust engagement therewith and thus hold the section in its adjusted new position. If the adjustment is in the reverse direction the nut 137 is first threaded along the hub portion of the member 135 to provide space between it and the member 141 and the section may be moved with the member 141 into engagement with the nut 137, which will then act as a thrust member to hold the parts in proper relation.

Each printing cylinder has a scraper or knife 143 suitably supported by supporting means 144 carried on a rock shaft 145 rotatably carried or supported in the end walls of an inking fountain. The scraper mechanism, as will be clear, is included within the space in the inking fountain. One end of the shaft 145 extends beyond the wall supporting the same and into a chamber provided in the inking fountain for housing the operation mechanism for the shaft. This shaft or rod is connected to a channeled member 146 with which cooperates a yoke 147 pivotally supported upon a stud shaft 148 and being actuated at its other end 149 by a cam 150 connected to a worm gear 151 driven by a worm 152 connected to a gear 153 mitred with a gear 154 rigid with a gear 156 in mesh with a pinion 157 rigid with or forming an integral part of the driving member 122 of the coupling. (See Figures 10, 15, and 16 of the drawings.) It will be apparent from the above that there is an actuating means for each scraper, and the operation of the same is to give the scraper a longitudinal reciprocation and yet be able to rock the knife toward or away from the cylinder when it is desired to adjust the same in proper position. It will be noted that the knife or scraper is carried by the fountain which also carries the printing cylinder so that there is a fixed relation between the scraper and the cylinder irrespective of the movement of the printing cylinder with the rest of the members of the section when adjustment is being made for any purpose.

The wall portions at the ends of the fountains are suitably provided with packing means 158, 159, 160 and 161 and 162 as a sealing means between the rotating parts passing through these walls and to exclude foreign matter, such as dust, oil and the like.

In the process of using the invention, the etchings are made upon copper cylinders or the like, by placing thereon the transfers or the gelatine pigment papers photographically sensitive so that the etching of the impressions may be made upon the cylinder. A number of these etchings may be placed upon the cylinder in the direction of the axis and over the surface of the cylinder. Each component, such as 170, 171, 172 and 173 shown in Fig. 2, may be placed upon the cylinder 36 as shown in that figure. Since this cylinder is the key or guide cylinder, it is only necessary that these be placed on the cylinder in line parallel to the axis of the cylinder, but it is not necessary that all the impressions be exactly in alignment. Now in each colored couple or unit, there is a cylinder, such as cylinder 13, which is a short cylinder and upon which is placed the etching 170, such that these etchings will be in line with the etching 170 on cylinder 36 (see Fig. 2 of the drawings). Similarly the etching 171 will be placed on the next

alternate and staggered cylinder 11 of each unit, so that they will also be in line with the correlative etching 171 on the cylinder 36. Similarly etching 172 will appear on cylinder 12 of each unit, and etching 173 will appear on each cylinder 10 of each color unit and be respectively in line with 172 and 173 of cylinder 36. Should any of these etchings on the short cylinders be not exactly in line with the etching 171 on cylinder 36, or in other words, should be either to one side or the other, then a longitudinal adjustment of the small cylinder may be made until the etchings are all in exact alignment with the etching 170 on the cylinder 36; similarly for the other etchings. Should an etching be in advance or behind the proper position for registry with the guide and correlative etching on the cylinder 36, an angular adjustment of the printing cylinder carrying such etching may be made until it is in proper position to make its impression upon the impression of the etching of cylinder 36. When the worker is placing the etchings on the small cylinders, he exercises great care that they will be located exactly parallel to the axis of the cylinder. If, however, there is a slight deviation, it is possible to make a slight adjustment of the printing unit to take care of this within certain limits. The coupling between the cylinders will permit this to a certain extent. If the laying of the ink be too light or too heavy, then a transverse adjustment of the unit may be made so to obtain the proper pressure between the printing cylinder and the impression roller.

From the above, it will be apparent that the adjustment of all the impressions made by the short cylinders are made independently and separately of the others and may be made to register exactly with the impressions made by the etchings 170, 171, 172 and 173 on the cylinder 36. In this way, there is an avoidance of throwing some etchings out of register when attempting to make others register as heretofore.

In the operation of the printing press, web 1 passes through the first couple for printing on the opposite side from that of the web where the colored pictures appear, and then the web passes through the several units for receiving the component impressions which are made to register with each other and with the correlative impressions on the key cylinder 36. The web is then passed to a cutting and folding apparatus as is usual in printing presses.

While I have herein described and upon the drawing shown and illustrated an embodiment of the invention, it is to be understood that the invention is not limited to the particular features, details, arrangement of parts and construction shown and described, but that other features, details, arrangements of parts and constructions are

comprehended thereby without departing from the spirit thereof.

Having thus disclosed the invention, I claim:

1. A printing unit, comprising a plurality of printing sections each having a cylinder, a color fountain, and means for rotatably supporting the cylinder and carried by the fountain, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

2. A printing unit, comprising a plurality of printing sections each having a cylinder, a color fountain, means for rotatably supporting the cylinder and carried by the fountain, and means for adjusting the position of each section, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

3. A printing unit, comprising a plurality of printing sections each having a cylinder, a color fountain, means for rotatably supporting the cylinder and carried by the fountain, means for supporting the fountain, and means associated with said supporting means and said fountain for adjusting the position of said fountain on said support, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

4. A printing press, comprising a plurality of printing units, each unit having printing means for printing component parts of composite impressions in a relation transverse to the length of the web passing thru the press, the impressions made in one of said units serving as a key for the impression made in the other units upon said web, said other units having separately operated means for making component impression, and means for effecting an adjustment of each of said separately operated means.

5. A printing unit, comprising printing sections, each having a printing cylinder, means for driving each cylinder, means for angularly adjusting each cylinder and means for radially adjusting each cylinder, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

6. A printing unit, comprising printing sections, each having a printing cylinder, means for driving each cylinder, and means for radially adjusting each cylinder, said printing sections being relatively narrow

with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

7. A printing unit, comprising printing sections, each having a printing cylinder, means for driving each cylinder, means for angularly adjusting each cylinder, means for axially adjusting each cylinder and means for radially adjusting each cylinder, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

8. A printing unit, comprising printing sections, each having a printing cylinder, means for driving each cylinder, means for radially adjusting each cylinder and means for axially adjusting each cylinder, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

9. In a printing unit, a plurality of printing sections each comprising a printing cylinder, a fountain therefor and associated therewith to form a printing structure, and means for moving said cylinder and fountain in unison, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

10. In a printing unit, a plurality of printing sections each comprising a printing cylinder, a fountain, and means carried by the fountain for rotatably supporting said cylinder, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

11. In a printing unit, a plurality of printing sections each comprising a printing cylinder, an ink fountain for said cylinder, means carried by the fountain for rotatably supporting said cylinder, and scraper means carried by said fountain and associated with said cylinder for scraping action, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

12. In a printing unit, a plurality of printing sections each comprising a printing cylinder, a fountain, means carried by the fountain for rotatably supporting said cylinder, and means associated with said fountain and said unit for effecting an adjustment of position of said fountain and the parts carried by

it, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

13. In a printing press unit, a printing section comprising a printing cylinder and ink fountain for said cylinder, means carried by the fountain for rotatably supporting said cylinder, scraper means carried by said fountain and associated with said cylinder for scraping action, and driving means for said cylinder and said scraper means, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

14. In a printing unit having a support, printing sections on said support, each printing section comprising a fountain, means for adjustably securing the fountain to the support, a printing cylinder, means carried by the fountain for rotatably supporting the cylinder, and means for driving the cylinder, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

15. In a printing unit having a support, printing sections on said support, each printing section comprising a fountain, said support and said fountain having slot and bolt connections whereby the fountain may be adjusted in relation to the support and secured in adjusted position and printing means associated and movable with the fountain, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

16. In a printing unit having a support, printing sections on said support, each printing section comprising a fountain, said support and said fountain having slot and bolt connections whereby the fountain may be adjusted in relation to the support and secured in adjusted position, a printing cylinder, means carried by the fountain for rotatably supporting the cylinder, and means for driving the cylinder.

17. In a printing unit, printing sections, driving means therefor comprising a main drive, and branch drives to said sections, and means for making an adjustment between said branch drives, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

18. A printing unit for printing presses,

comprising short printing cylinders arranged in ranks and with the cylinders of one rank in staggered axial relation with the cylinders of an adjacent rank, and means for driving said cylinders, said driving means having a driving connection to each rank of cylinders for independent driving thereof, and each cylinder being angularly adjustable with respect to the adjacent cylinder.

19. A printing unit for printing presses, comprising short printing cylinders arranged in ranks and with the cylinders of one rank in staggered axial relation with the cylinders of an adjacent rank, and means for driving said cylinders, each of said cylinders having a driving connection in said driving means, and means in said connection for effecting an adjustment of drive to each cylinder.

20. A printing unit for printing presses, comprising short printing cylinders arranged in ranks and with the cylinders of one rank in staggered axial relation with the cylinders of an adjacent rank, and means for driving said cylinders, said driving means comprising separate drives for each rank of cylinders, and adjustable driving connections in each of said drives for each cylinder driven by said drive.

21. A printing unit comprising a plurality of printing sections, driving means for said sections, each section comprising a printing cylinder, a fountain having means for rotatably supporting said cylinder, a scraper for said cylinder, means connected to said driving means and said scraper for operating the same, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

22. A printing unit comprising a plurality of printing sections, driving means for said sections, each section comprising a printing cylinder, a fountain having means for rotatably supporting said cylinder, a scraper for said cylinder, means connected to said driving means and said scraper for operating the same, said fountain having means for housing said scraper operating means, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

23. A printing unit comprising a plurality of printing sections, driving means for said sections, each section comprising a printing cylinder, a fountain having means for rotatably supporting said cylinder, a scraper for said cylinder, and supported by said fountain, means located in said fountain for oscillating said scraper and being connected to and operated by said driving means, said printing sec-

tions being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

24. In a driving device for printing cylinders, a coupling comprising means for permitting relative axial adjustment between cylinders, and means comprising an adjustable collar carried by a coupling for holding the cylinders in adjusted relation.

25. In a driving device for printing cylinders, a coupling comprising means for permitting relative axial adjustment between cylinders, and adjustable thrust means carried by the coupling for taking up loose play and to maintain the cylinders in adjusted relation.

26. In a driving device for printing cylinders, a coupling comprising means for permitting relative axial adjustment between cylinders, means for permitting relative angular adjustment of said cylinders, and means carried by the coupling for maintaining the adjusted relation of said cylinders.

27. In a driving device for printing cylinders, a coupling comprising means for permitting relative axial adjustment between cylinders, means for permitting relative radial adjustment of said cylinders, means for permitting relative angular adjustment of said cylinders, and means for maintaining said cylinders in adjusted relation.

28. In a printing unit, a printing section comprising a printing cylinder, a scraper therefor, means for operatively supporting said cylinder and scraper and for maintaining a fixed relation between the cylinder and scraper irrespective of the position of the cylinder, and means for adjusting the cylinder axially and transversely.

29. A printing unit comprising a support, a plurality of printing sections on said support, means for adjustably holding said sections on said support, means for causing adjustment of each of said sections independently of the other sections in transverse directions, and printing means included in each section, each printing means comprising a printing cylinder, a scraper for the cylinder, and means for supporting the cylinder and scraper whereby the scraper is moveable with the cylinder in unison, said printing sections being relatively narrow with respect to the width of the web and being each adapted to print an impression upon a particular part of the web independently of the printing of the remainder of said web.

30. In a printing press, the combination of a printing unit for printing across the full width of the web, a plurality of partial width printing units adapted collectively to print a number of impressions across the width of the web, said last mentioned printing units including a printing cylinder and a fountain

connected together for movement as a unit, and means for adjusting said partial width printing units independently of the full width printing unit.

31. In a printing press, the combination of a printing unit for printing across the full width of the web, a plurality of partial width printing units adapted collectively to print a number of impressions across the width of the web, driving means for each of said printing units and actuated from a common driving source, and means in said driving means for individually adjusting the printing units.

32. A printing press comprising a plurality of printing units, some thereof comprising sections spaced across the width of the web, each unit having printing means for printing component parts of composite impressions, one of said units acting as a key to which the other units may be adjusted for proper registration of the component parts of the impressions, said other units having means for adjusting the same to effect registration of said parts.

In witness whereof, I hereunto subscribe my name to this specification.

OTTO R. WOLF.