F. C. MARQUARDT.

REGISTERING MECHANISM FOR FORM OR PLATE CYLINDERS OF MULTICOLOR PRINTING MACHINES.

APPLICATION FILED MAY 18, 1918.

1,328,842.

Patented Jan. 27, 1920.

2 SHEETS—SHEET 1.

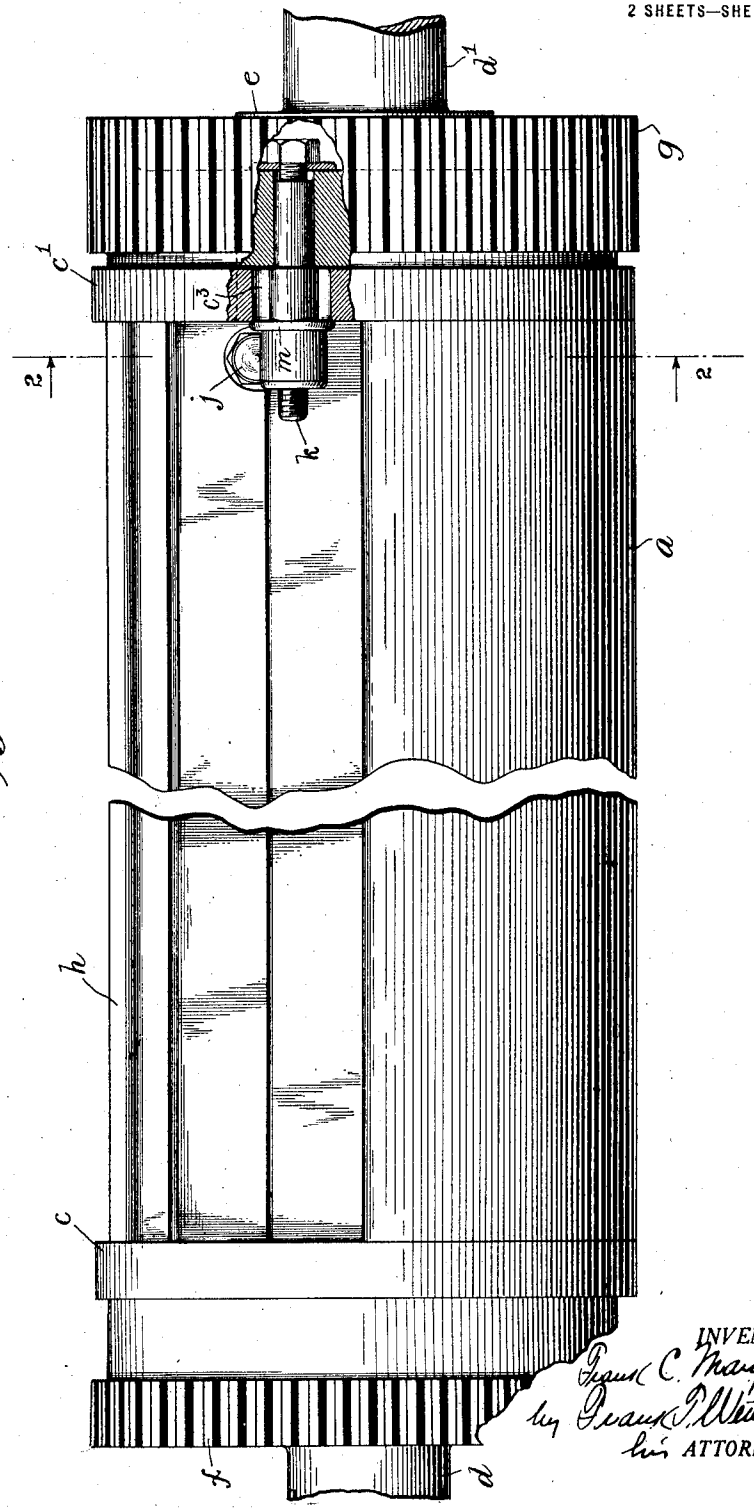


Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 3.

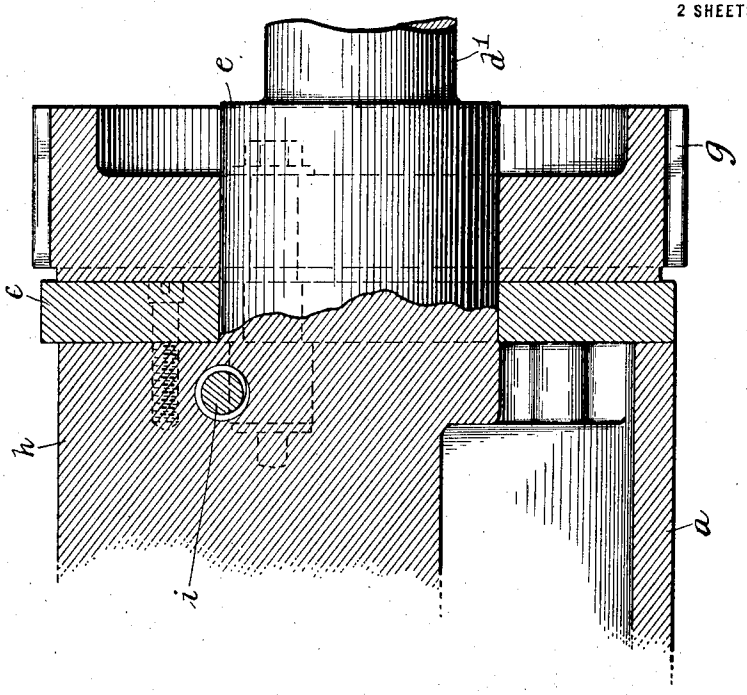
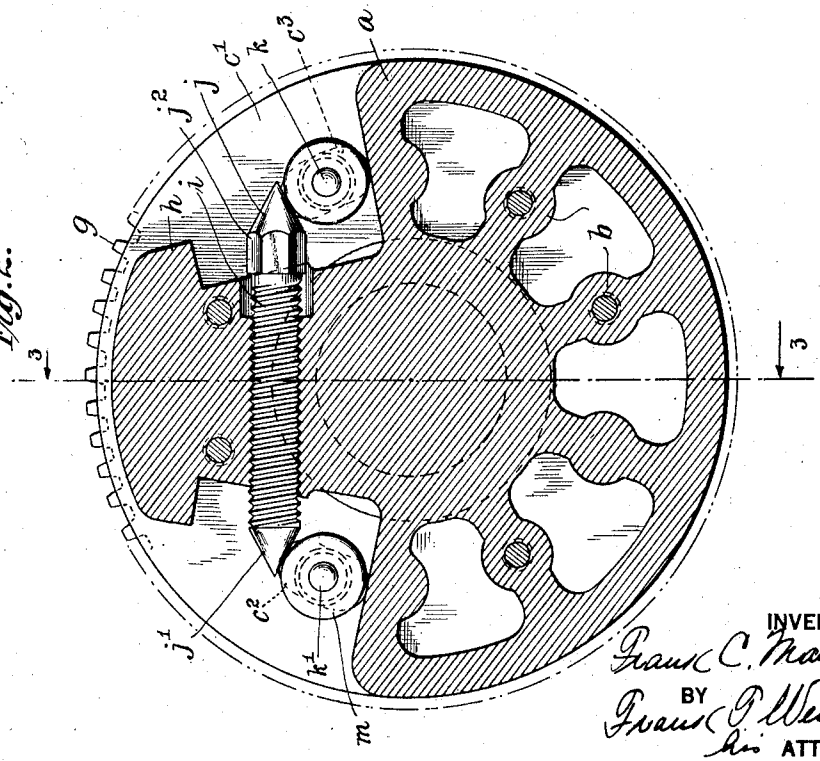


Fig. 2.



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UNITED STATES PATENT OFFICE.

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REGISTERING MECHANISM FOR FORM OR PLATE CYLINDERS OF MULTICOLOR-PRINTING MACHINES.

1,328,842. Specification of Letters Patent. **Patented Jan. 27, 1920.**

Application filed May 18, 1918. Serial No. 235,330.

To all whom it may concern:

Be it known that I, FRANK C. MARQUARDT, a citizen of the United States, residing at the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Registering Mechanism for Form or Plate Cylinders, of Multicolor-Printing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings, which form a part thereof.

The invention relates to registering mechanisms for form or plate cylinders of multicolor printing machines and more particularly to a mechanism by means of which any cylinder may be adjusted circumferentially thereof to secure accurate register of the design on the plate upon said cylinder, with the design on the plate upon another cylinder, or other cylinders, so as to secure accuracy in the register of the different colors upon the print.

Heretofore, it has been the common practice, when the design has been collected upon an offset cylinder, to drive the various plate cylinders of a multicolor printing machine, by means of a planetary gear system, or by means of a gear strain when succeeding impressions have been made directly upon a sheet, by means of plates upon the form cylinders of a sequence of printing couples. In either form of press, great difficulty has always been experienced in securing a proper register of the designs on the plates upon different form cylinders.

A structure commonly employed for permitting relative adjustment of the different plates involves the use of a cylinder mounted to have rotary movement independently of its driving gear, and connected therewith by means of segmental slots in one of these members and coöperating bolts carried by the other member. The adjustment of the cylinder is secured by loosening the bolts, and turning the form cylinder by hand sufficiently to bring the design thereon to the desired position, the bolts being then reset to preserve this adjustment. This structure does not permit positive, minute adjustment of the form cylinder with relation to its gear; and, when the desired adjustment has been secured, there is likelihood of a loss of adjustment when resetting the bolts connecting the form cylinder and its gear.

With a registering mechanism for a form or plate cylinder made in accordance with my invention, it is not only possible to secure minute adjustment of a cylinder, but at all times the cylinder and the gear are operatively connected so that when the adjustment is once secured, this adjustment is permanent. The adjusting mechanism is so constructed that it may be used with equal facility to turn the cylinder in either direction, the operative effect being the same irrespective of the direction of movement of this cylinder.

No lost motion can exist, or develop, in the actuation of the adjusting mechanism, thus insuring a permanent substantially rigid connection between the form cylinder and its driving gear, which cannot become loose as the result of vibration resulting from the operation of the machine.

The registering mechanism is so constructed as to be capable of securing practically a micrometrical adjustment of a form cylinder without requiring nicety in the proportioning, or finish, of the parts of the mechanism, or of any great accuracy in assembling the coördinate parts of the mechanism in the machine structure. Furthermore, the entire mechanism may be incorporated in each form cylinder in a manner to avoid possible interference of parts, and any complexity in the design of the machine.

The invention consists primarily in a registering mechanism for a form or plate cylinder for multicolor printing machines embodying therein the combination with a form or plate cylinder and a driving gear therefor, capable of relatively independent rotation about the same axis, of adjusting means for said form cylinder embodying therein a plurality of studs carried by one of said members, and a reciprocatory member having a wedgelike surface engaging each of said studs, and carried by the other member, said reciprocatory member being provided with means whereby it may be actuated, whereby power is applied to said cylinder by said gear to rotate said cylinder in unison therewith, and rotary movement may be imparted to said cylinder independently of said gear; and in such other novel

features of construction and combination of parts as are hereinafter set forth and described, and more particularly pointed out in the claims hereto appended.

Referring to the drawings:

Figure 1 is a front view partly in elevation and partly in section, of a form or plate cylinder embodying the registering mechanism of my invention;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a section on the line 3—3 of Fig. 2.

Like letters refer to like parts throughout the several views.

In the embodiment of my invention shown in the drawings, *a* indicates an ordinary form or plate cylinder, the construction of which will vary according to the nature of the press upon which it is used. In the accompanying drawings, this cylinder is adapted to receive a plate for impressing an ink design upon an offset cylinder (not shown) and has a semi-cylindrical bearing surface to receive the plate. The said cylinder is provided with a plurality of suitable reinforcing spokes *b*, disks or end plates *c*—*c'* being bolted to said spokes so as to rotate with said cylinder. The cylinder *a* is mounted in the machine frame by means of the arbors *d*—*d'* adjacent one of which as *d'* is a hub *e* upon which the driving gear *g* is idly mounted. By this construction, the gear *g* and cylinder *a* are capable of relatively independent rotation, and the cylinder may receive circumferential movement independently of said gear.

In order to permit the transmission of power from the gear *g* to the cylinder *a*, it is essential to provide operative connections by means of which power may be applied by said gear to the said cylinder, and in a cylinder structure made in accordance with my invention, I utilize said connections not only for the purpose of transmitting power, from said gear to said cylinder, but for imparting circumferential movement to said cylinder independently of said gear for the purpose of varying the position of the plate with relation to the plate upon another, or other cylinders, in order to secure accurate register of the design on the plate carried thereby and the designs on a plate, or plates, carried by another, or other, cylinders incorporated in such machines.

In the form of the invention shown, this means comprises coöperating members carried by and rotatable with the form cylinder and carried by and rotatable with the driving gear therefor respectively. These members coöperate with each other to transmit power from said gear to said cylinder, and one of said members may be adjusted with relation to the other, its movement resulting in the circumferential movement of the form cylinder since the gear by reason of its meshing with other gears is incapable of such movement.

The form cylinder of a printing press embodying the characteristics of that shown in the accompanying drawings has within the recessed portion of the cylinder, a longitudinal extending counterweight *h*, the plates *c*—*c'* being bolted or otherwise secured to said counterweight in addition to being bolted to the spoke *b*. The counterweight *h* is provided at the end thereof adjacent the plate *c* with an interiorly screw threaded opening having mounted therein an adjustable screw *i* having conical ends *j*—*j'*. A portion of this screw is provided with suitable means as the hexagonal portion j^2 to facilitate its rotation by means of a wrench or other suitable tool to move it in a direction tangential to the path of rotation of the cylinder *a*. Said screw *i* coöperates with the studs *k*—*k'* carried by the gear *g*, which studs pass through segmental openings as c^2—c^3 through the plate *c*, so as to come within the operative range of the conical ends *j*—*j'* of the screw *i*.

The screw *i* has a fine pitch so as to permit a minimum longitudinal movement of the screw, the conical ends forming a continuous circular wedging surface operative upon the studs *k*—*k'*.

The screw *i* being positioned close to the plate *c* will not interfere with the clamping mechanism for securing the plate upon the cylinder *a* while the open portion of the cylinder adjacent the counterweight *h* will permit ready access to the screw with a spanner wrench, or other suitable tool.

The studs *k*—*k'* respectively are provided with a rotatable bushing *m* to minimize wear thereon and on the screw ends *j*—*j'*, and facilitate the actuation of the screw *i*.

The operation of the herein described device is substantially as follows:—

Under normal conditions the conical ends *j*—*j'* of the screw *i* are in contact with the studs *k*—*k'* carried by the gear *g* so that to all intents and purposes, the cylinder *a* through the counterweight *h* is rigidly connected with said gear *g* without possibility of there being any lost motion. The studs *k*—*k'* are both arranged at the same radial distance from the axis of the cylinder *a* and since the screw *i* is tangential to a circle of smaller radius about the same axis, this relation may be readily secured by properly proportioning the length of said screw.

If it be found during the make-ready of a press that the plate upon any cylinder is out of register, it is merely necessary to turn the screw *i* of the cylinder carrying the plate which is out of register in either direction according to the necessity for imparting movement to the cylinder *a* in the

necessary direction to bring the plate into register. With the rotation of said screw *i*, the conical end *j* or *j'* thereof coöperating respectively with the stud *k* or *k'* will impart very slight movement to the cylinder, the recession of one of the conical portions of said screw from its stud simultaneously with the advance of the other conical end toward its stud, permitting this adjustment of the cylinder without disturbing the normal operative driving relation between the gear and the cylinder. Of course, it is essential in making this adjustment, that the machine be stopped. By properly determining the angle of the face of the conical ends of the screw, practically micrometrical adjustment of the form cylinder may be secured with threads of fairly coarse pitch.

During the make-ready of a press and in preparing the plates, approximate accuracy in the positioning of the portions of the design upon different plates can be secured; but, particularly with high grade work, absolute accuracy of register is necessary. By using an adjustable member such as the screw *i* having conical ends *j*—*j'* bearing against and overhanging the coöperating studs *k*—*k'* respectively, I secure a reducing mechanism operative upon said studs, the ratio of reduction being determined by the relatlve pitch of the threads upon the screw *i* and of the sides of the conical ends *j*—*j'*. Hence, with the rotation of the screw *i*, the quantity of movement of the cylinder is determined not by the lineal movement of this screw, but by the operative effect of the wedge formed by the ends *j*—*j'* with this given quantity of lineal traverse.

At all times, the ends *j*—*j'* of the screw *i* engage the studs *k*—*k'* respectively, the movement of said screw in either direction imparting circumferential movement to the cylinder without disturbing this permanent relation of parts since if the end *j* is advanced axially toward the axis of the stud *k*, the end *j'* will recede from the axis of the stud *k'* to the same extent, the movement of the cylinder as a result of the actuation of this screw being such as to cause the end *j* to move away from the axis of the stud *k* and the end *j'* to move toward the axis of the stud *k'* in a manner to insure continuous engagement of both studs with said screw. The same condition prevails if the screw *i* be moved axially toward the axis of the stud *k'* there being, however, a reversal of direction of movement of the cylinder and of the screw carried thereby.

In the form of the invention shown, the axial movement of the screw *i* will, through engagement with one of the studs *k* or *k'* and the resultant circumferential movement of the cylinder, increase the distance between the axis of said screw and the axis of that stud against which the screw is thrust, and decrease the distance between the axis of said screw and the axis of the other stud.

In the accompanying drawings and description I referred to the studs *k*—*k'* as being carried by the gear *g* and the screw *i* as being carried by the plate cylinder. It is apparent, however, that this relation of parts might be reversed without varying the operative effect of the adjusting mechanism, it being merely necessary that the plate-carrying member and the member for applying power thereto, be connected by studs carried by one of these members and a cooperating screw carried by the other member.

While I have described the registering mechanism as being particularly adapted for use in multicolor printing machines having a plurality of cylinders, it is apparent that this mechanism may be employed for securing circumferential register of the plate in relation to the sheet feeding mechanisms of other types of presses.

In the accompanying drawings the gear *f* is the driving gear for the inking mechanism and is immaterial to the present invention.

It is not my intention to limit the invention to the precise details of construction shown in the accompanying drawings, it being apparent that such may be varied without departing from the spirit and scope of the invention.

Having described the invention what I claim as new and I desire to have protected by Letters Patent, is:—

1. A registering mechanism for a form or plate cylinder for multicolor printing machines, embodying therein in combination with a plate-carrying member and a member for applying power thereto, said members being capable of independent rotary movement about the same axis, of an adjusting mechanism for said plate-carrying member, comprising two studs carried by one of said members and an adjustable screw threaded member carried by the other member and having conical ends engaging said studs, whereby power is applied to said plate-carrying member by said power member to rotate said members in unison, and said plate-carrying member may be turned independently of said power member.

2. A registering mechanism for a form or plate cylinder for multicolor printing machines, embodying therein in combination with a plate carrying member and a member for applying power thereto, said members being capable of independent rotary movement about the same axis, of a plurality of studs carried by one of said members, and a reciprocatory member having a wedge-like surface engaging each of said studs carried by the other member, said reciprocatory member being provided with means whereby

it may be actuated, whereby power is applied to said plate-carrying member by said power member to rotate said members in unison, and said plate-carrying member may be turned independently of said power member.

3. A registering mechanism for a form or plate cylinder for multicolor printing machines, embodying therein in combination with a plate-carrying member and a member for applying power thereto, said members being capable of independent rotary movement about the same axis, of a plurality of studs carried by one of said members at the same radial distance from the axis of rotation thereof, a reciprocatory member extending tangentially of a circle about said axis, but at a lesser radius than said studs, opposite ends of said member having wedge-like surfaces engaging said studs respectively, and means whereby said reciprocatory member may be actuated, whereby power is applied to said plate-carrying member by said power member, and said plate-carrying member may be turned independently of said power member.

4. A registering mechanism for a form or plate cylinder for multicolor printing machines, embodying therein in combination with a form or plate cylinder and a driving gear therefor, said cylinder and said gear being capable of relatively independent rotation about the same axis, and said cylinder having a reduced counterweighted portion at one side thereof, of adjusting means for said form or plate cylinder, embodying therein a plurality of studs carried by said gear, and an adjustment screw mounted in said counterweight, said screw having conical ends engaging said studs respectively, whereby power is applied to said cylinder by said gear to rotate said cylinder in unison therewith, and rotary movement may be imparted to said cylinder independently of said gear.

5. A registering mechanism for a form or plate cylinder for multicolor printing machines, embodying therein in combination with a form or plate cylinder having an end plate provided with openings therethrough, and a counterweighted portion intermediate said openings, and a driving gear therefor, said cylinder and said gear being capable of relatively independent rotation about the same axis, of a plurality of studs carried by said gear and projecting though the openings in said end plate, and a screw adjustably mounted in said counterweight, and having conical ends engaging said studs respectively, whereby power is applied to said cylinder by said gear to rotate said cylinder in unison therewith, and rotary movement may be imparted to said cylinder independently of said gear.

In witness whereof I have hereunto affixed my signature this 2nd day of May, 1918, in the presence of two subscribing witnesses.

FRANK C. MARQUARDT.

Witnesses:
A. C. CARY,
EDWIN L. LANS.