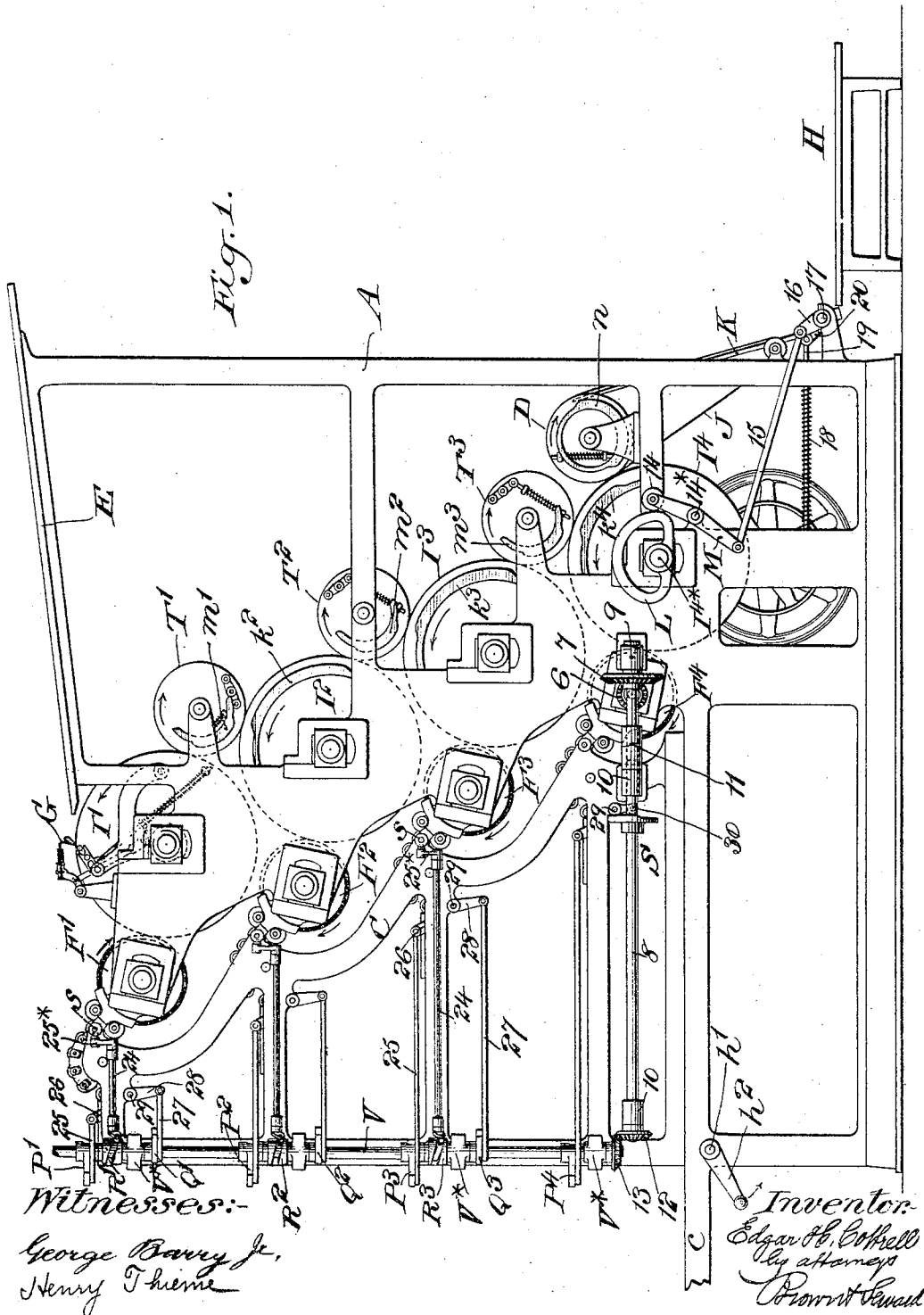


E. H. COTTRELL.
MULTICOLOR PRINTING MACHINE.

APPLICATION FILED FEB 20, 1902.

NO MODEL.

4 SHEETS—SHEET 1.

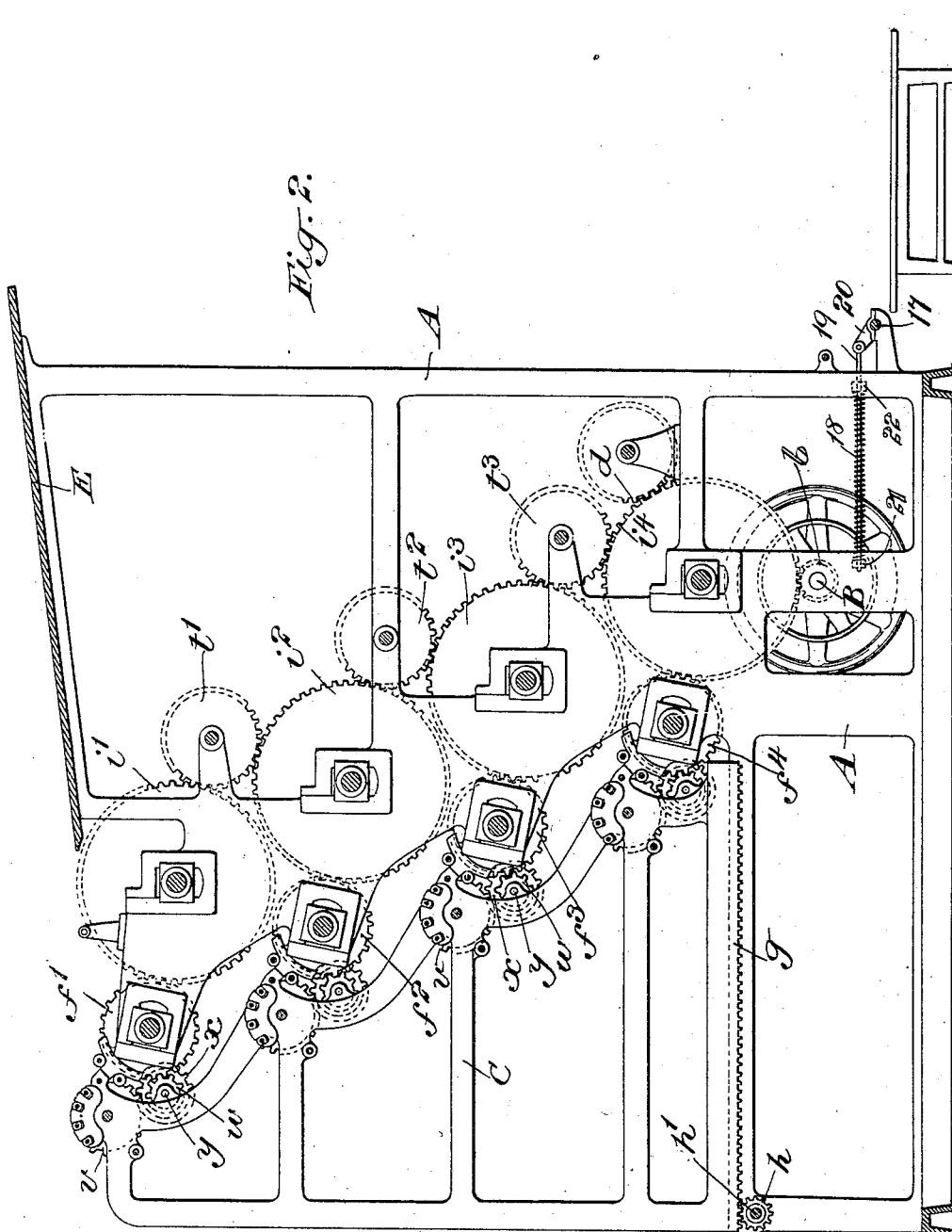


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4 SHEETS—SHEET 2.



Witnesses:
George Barry Jr.
Henry Thime

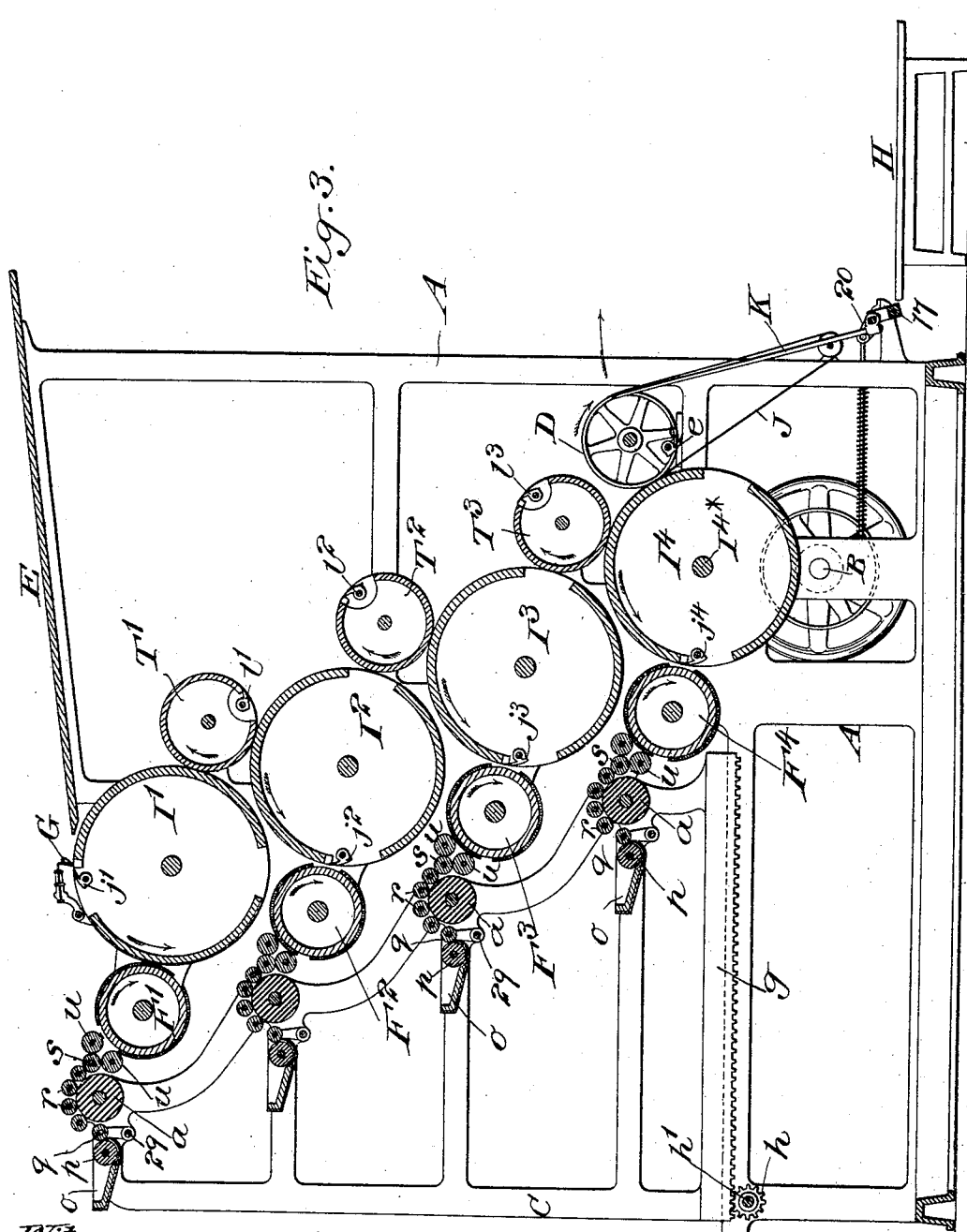
Inventor:
Edgar H. Cottrell
By attorneys
Brown & Howard

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4 SHEETS—SHEET 3.



Witnesses:
George Barry Jr.
Henry Thine

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4 SHEETS—SHEET 4.

Fig. 5.

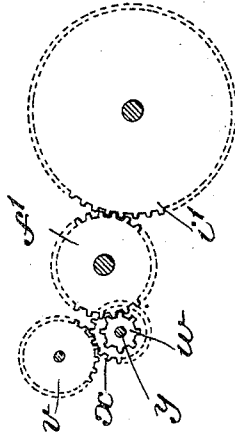
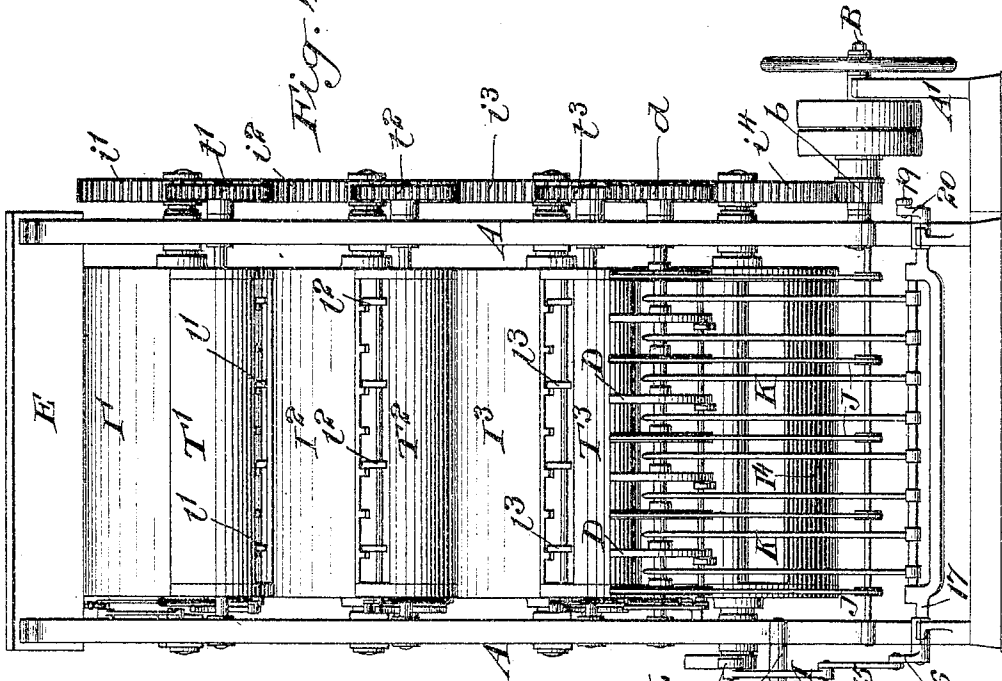


Fig. 4.



Witnesses:-

George Barry Jr.
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By attorneys
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UNITED STATES PATENT OFFICE.

EDGAR H. COTTRELL, OF STONINGTON, CONNECTICUT, ASSIGNOR TO C. B. COTTRELL & SONS COMPANY, OF NEW YORK, N. Y., AND STONINGTON, CONNECTICUT, A CORPORATION OF NEW JERSEY.

MULTICOLOR-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 774,162, dated November 8, 1904.

Application filed February 20, 1902. Serial No. 94,906. (No model.)

To all whom it may concern:

Be it known that I, EDGAR H. COTTRELL, a citizen of the United States, and a resident of Stonington, in the county of New London and State of Connecticut, have invented a new and useful Improvement in Multicolor-Printing Machines, of which the following is a specification.

A printing-machine embodying my invention comprises a series of two or more printing-couples, one for each color to be printed on the same side of a sheet, each of said couples consisting of a continuously-rotating form-cylinder and a continuously-rotating impression-cylinder and one or more continuously-rotating transfer-cylinders for transferring printed sheets from one of said couples to the next one in the series by which another printing is to be performed.

My improvement consists in certain combinations, hereinafter described and claimed, in which are included as elements such a series of printing-couples and their respective transfer cylinder or cylinders.

In the accompanying drawings, illustrating my invention, Figure 1 is a side elevation of a four-color-printing machine; Fig. 2, a vertical section parallel with Fig. 1, taken just inside of the framing; Fig. 3, a vertical section parallel with Fig. 1, taken through the several cylinders and the inking apparatus. Fig. 4 is an elevation of that end of the machine at which the feed and delivery take place. Fig. 5 is a side view of the gearing for driving the ink-cylinder of one set of inking apparatus.

A is the stationary main framing of the machine, containing the bearings for the journals of the four couples, consisting of the four form-cylinders $F^1 F^2 F^3 F^4$ and the four impression-cylinders $I^1 I^2 I^3 I^4$ and also the bearings for the journals of the three transfer-cylinders $T^1 T^2 T^3$ and the delivery-reel D. The said couples are arranged one above another. The transfer-cylinder T^1 is arranged between the impression-cylinders I^1 and I^2 , that T^2 between the impression-cylinders I^2 and I^3 , and that T^3 between the impression-cylinders I^3 and I^4 .

The several form-cylinders, impression-cylinders, and transfer-cylinders and the delivery-reel all derive continuous rotary motion at the same surface velocity through a train of gearing $i', i^2, i^3, i^4, f', f^2, f^3, f^4, t', t^2, t^3$, and d on the respective cylinders and reel from a gear b on the main shaft B, which has one of its bearings in one of the side frames A and the other in a stand A' , as shown in Fig. 4. The respective directions of their rotation are indicated on the several cylinders and their gears by arrows in Figs. 1, 2, and 3.

The impression-cylinders $I^1 I^2 I^3 I^4$ are respectively furnished with spring-closed grippers $j^1 j^2 j^3 j^4$ to be opened at proper points in the rotation of the respective cylinders for the reception and delivery of the sheets. The grippers j^1 of the first impression-cylinder are or may be opened first for the reception of the sheet and afterward for its delivery by means such as are commonly employed in rotary presses having only a single impression-cylinder and which need no description here. The grippers $j^2 j^3 j^4$ of the impression-cylinders $I^2 I^3 I^4$ are opened at the proper times by stationary cams $k^2 k^3 k^4$, attached to the framing A. The transfer-cylinders $T^1 T^2 T^3$ are respectively furnished with spring-closed grippers $l^1 l^2 l^3$ to be opened at proper points in their respective rotations by stationary cams $m^1 m^2 m^3$ on the framing. The delivery-reel D is also furnished with spring-closed grippers e to be opened at the proper point in its rotation by a stationary cam n on the framing. As all the grippers hereinabove referred to and the means for operating them are or may be like those commonly used on and in connection with the cylinders and delivery-reels of printing-machines and well understood by those skilled in the art, I do not consider it necessary to further describe them beyond saying that the operations of the several grippers are so timed that sheets presented to the first impression-cylinder I^1 from the feed-board E may be taken by the grippers of that cylinder, taken thence by the grippers of the first transfer-cylinder T^1 , thence by the grippers of the second impression-cylinder I^2 ,

and so on from one impression-cylinder to another, to be taken from the last one, I^1 , by the delivery-reel. It will be understood that every impression-cylinder carries the sheet into contact with its respective form-cylinder to receive the impression from the latter.

In front of the feed-board E is a sheet-gage G to stop the sheets presented from said board in proper position to be taken by the grippers of the cylinder I^1 . Below and behind the delivery-reel D is a table H for the reception of the several-times-printed sheets which pass from the reel down an endless tape-carrier J, whence they are taken by a fly K, to be thereby deposited on said table. Such a gage G and fly K being well-known in printing machinery need no particular description further than to say that the cam L, (see Fig. 1,) by which the fly is actuated and controlled, is on the shaft I^{4*} of the fourth and last impression-cylinder I^4 . This cam acts for the purpose on a roller 14 on one end of a lever M, which works on a fulcrum-pin 14^* , fixed on the framing A, and the other end of which is connected by a rod 15 with an arm 16 of the rock-shaft 17 of the fly. The roller 14 is held to the cam by a spring 18, which works on a rod 19, which is connected with an arm 20 on the fly rock-shaft 17 and which is confined between a fixed stop 21 on the framing A and a nut or collar 22 on said rod, the said stop serving also as a guide to the said rod.

The inking apparatus for the several form-cylinders is all arranged in a carriage C on horizontal ways c on the main framing, there being four sets, one for each form-cylinder. Each set is represented as consisting, as is common, of a fountain o , a fountain-roller p , ductor q , cylinder a , distributing-rollers r , a vibrator s , and form-rollers u . For the purpose of running forward the said carriage C to bring the whole inking apparatus at once into operative relation with the form-cylinders and to carry it all back far enough away from said cylinders to afford free access to each one of said cylinders for attaching the plates or forms thereto and for "making ready" a rack g is provided on the carriage C and a pinion h , gearing with said rack, is provided on a shaft h' , having bearings in the framing A and furnished with a hand-crank h^2 .

The cylinders a of the inking apparatus are represented as each driven from its respective form-cylinder by the same one of the spur-gears $f^1 f^2 f^3 f^4$ on the latter through which the cylinder itself receives its rotary motion, each inking-cylinder being furnished with a spur-gear v , (see Figs. 2 and 5,) which gears with one of two attached pinions $w x$, which turn freely on a stud y on the carriage C, the other of said pinions being so arranged that it comes into gear with the gear on the respective form-cylinder when the carriage is run up to the operative position. The foun-

tain-rollers p are represented as all deriving their rotary motion, the ductors q as all deriving their to-and-fro motion between the fountain-rollers and ink-cylinders, and the vibrators as all deriving their longitudinal reciprocating movement from one bevel-gear 6 (see Fig. 1) on the shaft of the lowest form-cylinder F^4 , which gears with a bevel-gear 7 on a horizontal shaft 8, arranged on one side of the framing A and carriage C. This shaft 8 is in two lengths, one of which works in a fixed bearing 9 on the framing A and the other in bearings 10 on the side of the carriage. These two shaft lengths are connected when the carriage is run into its operative position by a clutch 11. The shaft 8 is geared by bevel-gears 12 13 with an upright shaft V, arranged in bearings V^* on the side of the carriage C. This shaft V carries cams $P^1 P^2 P^3 P^4$ for producing the intermittent rotation of the several fountain-rollers p and also carries cams $Q^1 Q^2 Q^3$ for producing the movements to and fro of the ductors appertaining to the form-cylinders $F^1 F^2 F^3$ and also cams $R^1 R^2 R^3$ for producing the longitudinal reciprocating movements of the vibrators u , appertaining to the form-cylinders $F^1 F^2 F^3$. The fountain-roller cams $P^1 P^2 P^3$ are each connected by a yoke-rod 25 with the arm 26 of a rock-shaft, another arm of which carries a pawl engaging with a ratchet-wheel on the ink-cylinder. I have not thought it necessary to show the said rock-shaft, pawls, and ratchets, as they are common in other multicolor-printing machines in which the inking apparatus is in a movable carriage. The vibrator-cams $R^1 R^2 R^3$ act each through one of a corresponding number of rock-shafts 24, working in bearings on the sides of the framing, the said rock-shafts each carrying an arm 25*, engaging with the shaft of its respective vibrator. The ductor-cams $Q^1 Q^2 Q^3$ are each connected by a yoke-rod 27 with the arm 28 on the rock-shaft 29. The divided shaft 8 and the upright shaft V, with its cams, and their connections with the different rollers of the inking apparatus constitute no parts of the present invention; but owing to the inconvenience that would be involved in extending the shaft V below the said shaft 8 I operate the ductor q in the inking apparatus of the lowest form-cylinder by means of a cam S on the shaft 8, which acts upon a roller 30 on an arm of the rock-shaft 29 of that ductor, as shown in Fig. 1.

By the term "transfer-cylinder" as used in this specification I mean to include any rotary carrier of circular form furnished with means for taking the sheet from one printing-couple and transferring it to the next printing-couple in a series.

What I claim as my invention is—

1. In a multicolor-printing machine, the combination of a series of two or more printing-couples arranged one above another and each consisting of a continuously-rotating

form-cylinder and a continuously-rotating impression-cylinder, one or more continuously-rotating transfer-cylinders for transferring printed sheets from one to another of said couples, a stationary frame and bearings therein for the said cylinders, a series of sets of inking apparatus one set for each printing-couple, and a carriage in and by which the said several sets are movable together toward and from their respective printing-couples, substantially as herein described.

2. In a multicolor-printing machine, the combination of a series of two or more printing-couples arranged one above another and each consisting of a continuously-rotating form-cylinder and a continuously-rotating impression-cylinder, one or more continuously-rotating transfer-cylinders interposed between the printing-couples of the series, a stationary frame and bearings therein for the said cylinders, a series of sets of inking appa-

ratus one set for each printing-couple, a carriage in and by which the said several sets are movable together toward and from the respective printing-couples, a shaft in two coupled lengths one of which has bearings on said frame and the other bearings on said carriage, means for driving said shaft from one of said printing-couples, and a cam on that shaft length which is on said carriage for operating the ductor of one of said sets of inking apparatus, all substantially as herein described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of February, 1902.

EDGAR H. COTTRELL.

Witnesses:

FREDK. HAYNES,
LIDA M. EGBERT.