No. 651,971. Patented June 19, 1900.

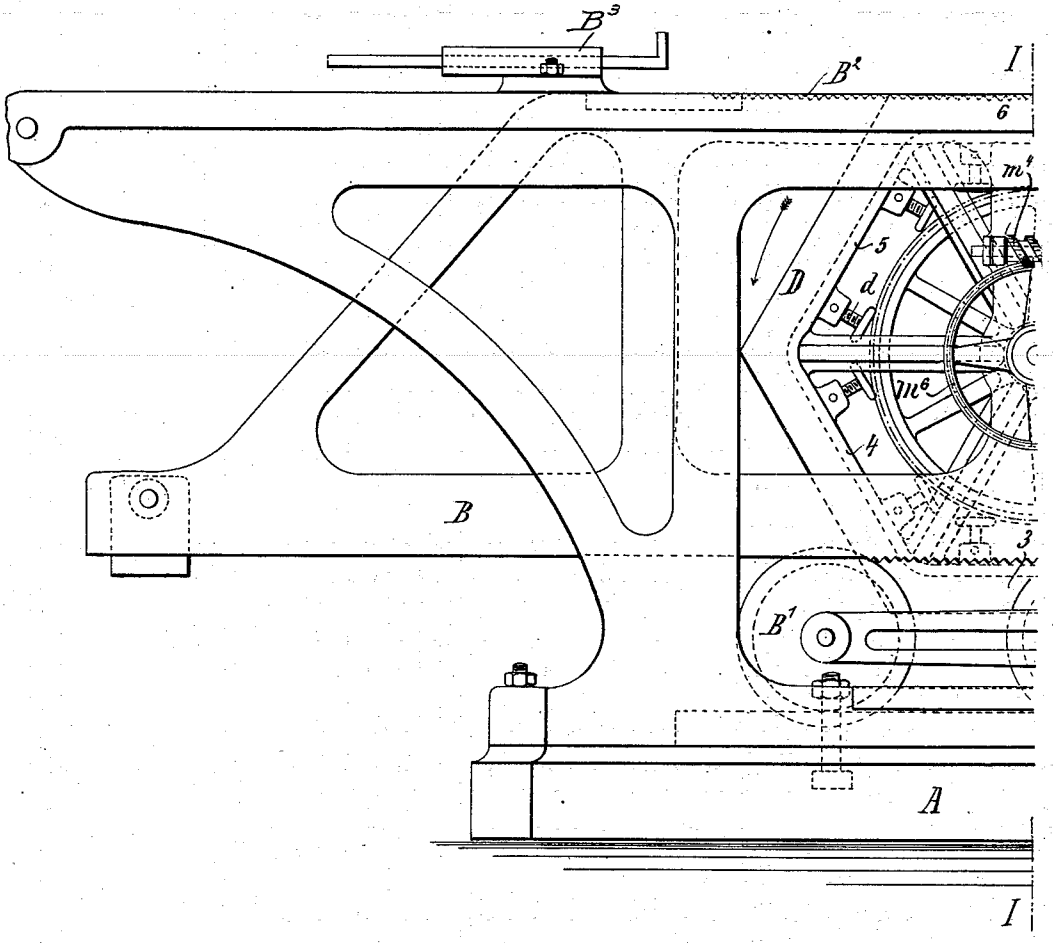
G. KEMPF.

MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 1.

Fig. 1.



Witnesses.
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No. 651,971. Patented June 19, 1900.

G. KEMPF.

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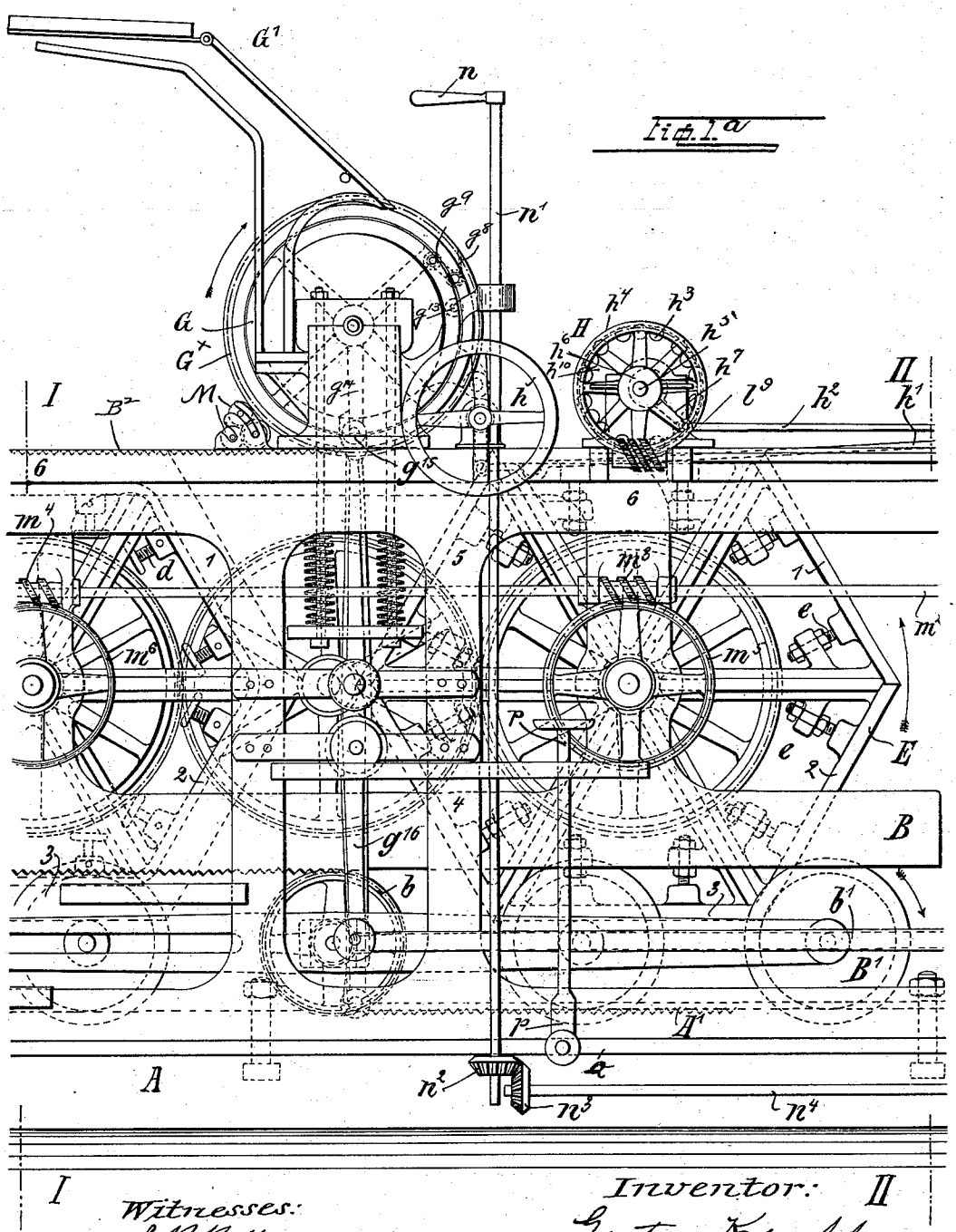
(No Model.) 14 Sheets—Sheet 2.



Witnesses:
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No. 651,971. Patented June 19, 1900.

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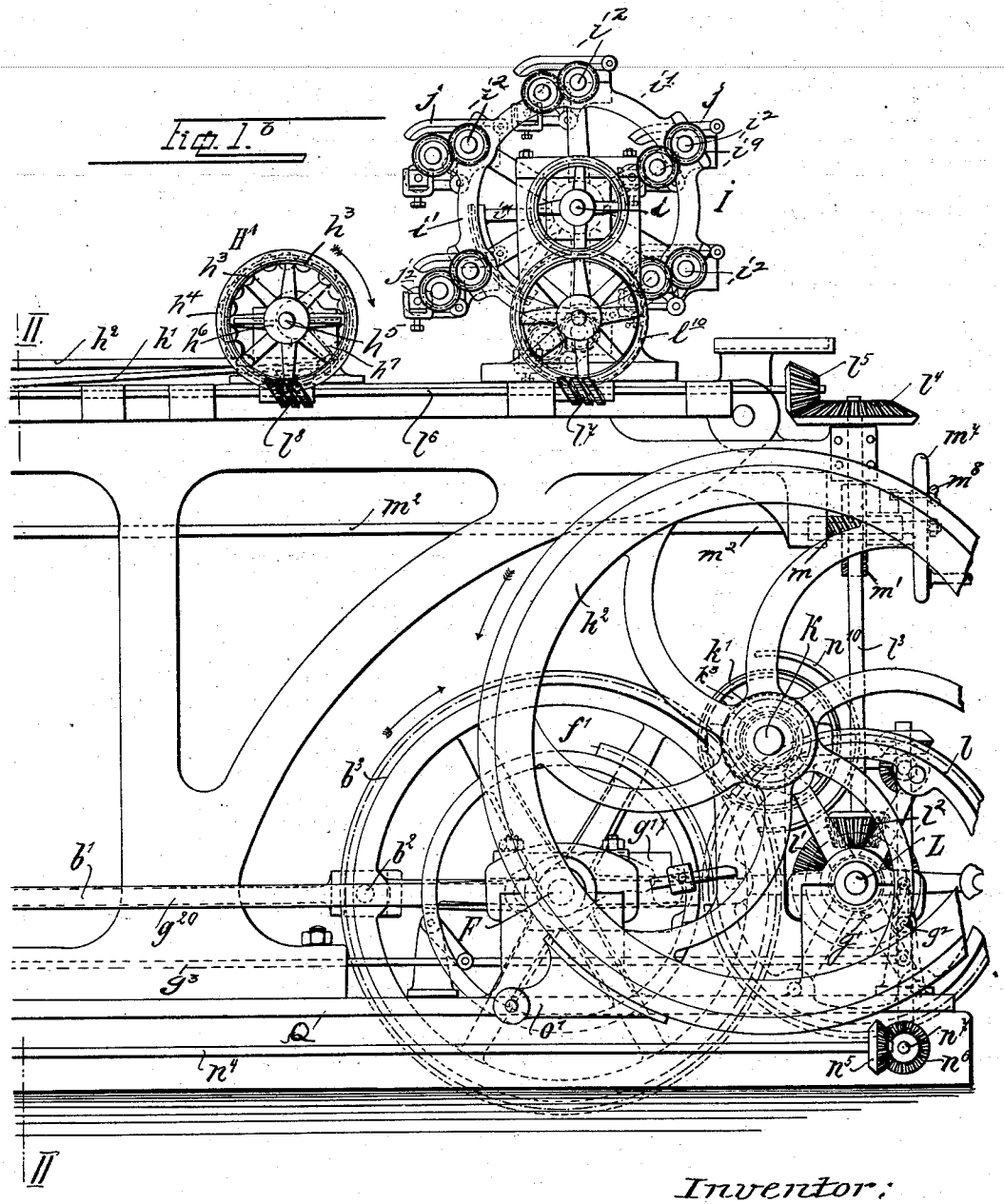
MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 3.

Fig. 1.



Witnesses:
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No. 651,971. Patented June 19, 1900.

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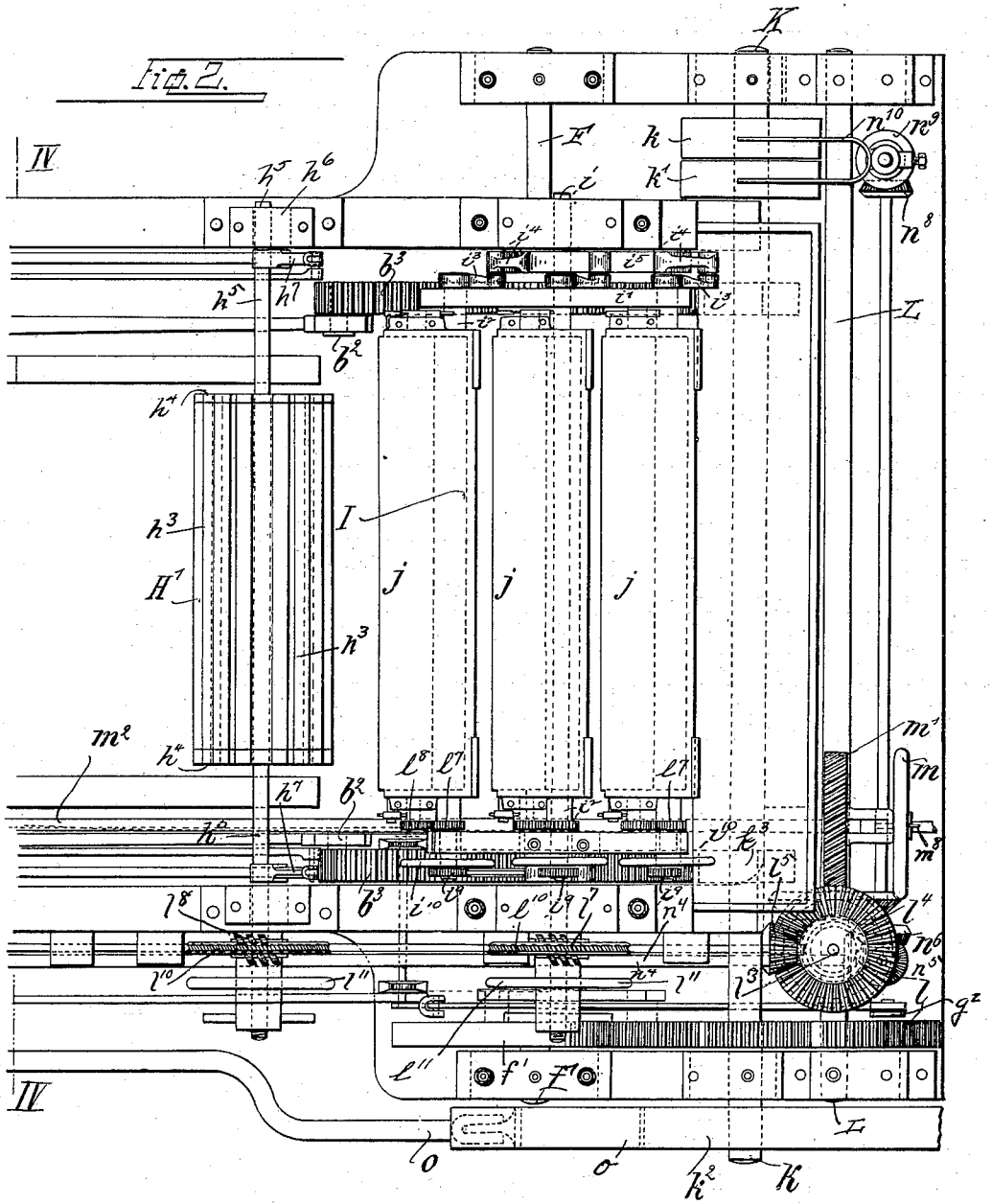
MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 4.

Fig. 2.



Witnesses:
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No. 651,971. Patented June 19, 1900.

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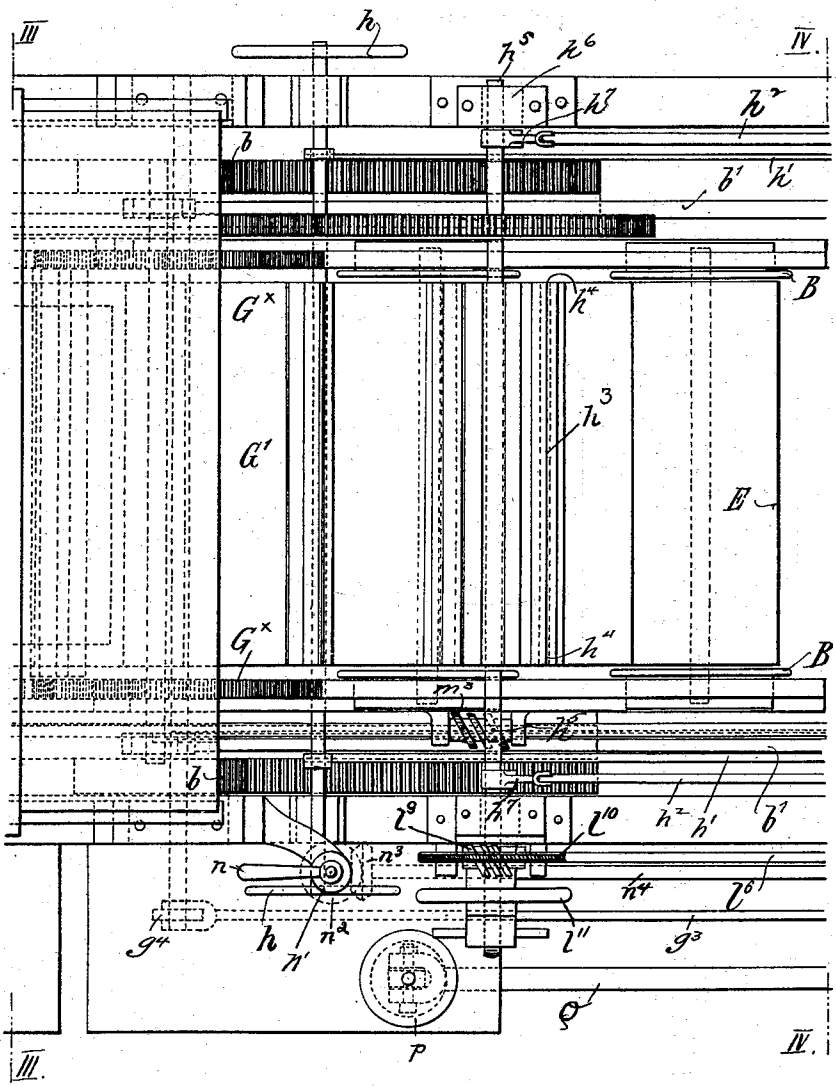
MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 5.

Fig. 2.a



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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 6.

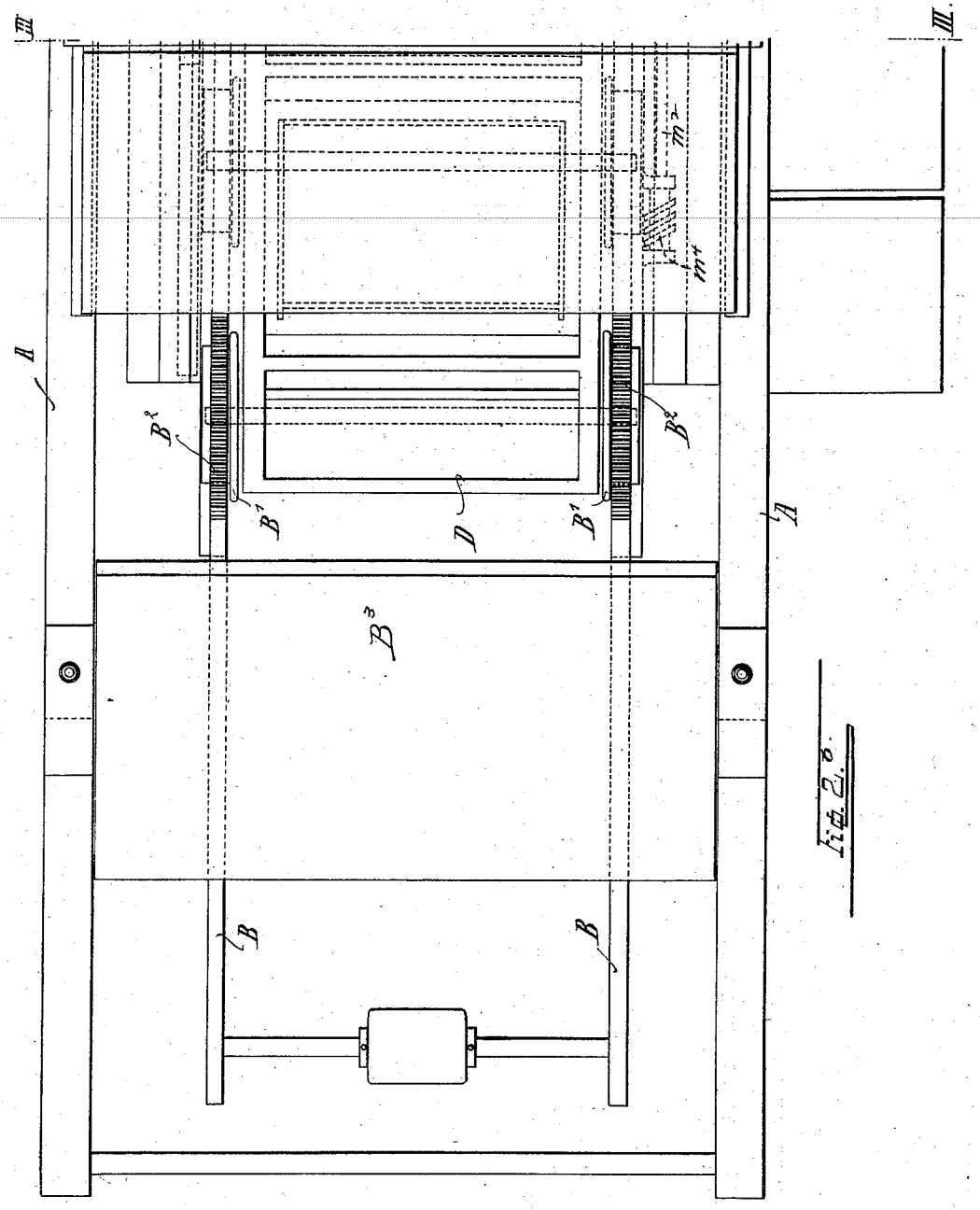

Fig. 2.

Witnesses:
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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 7.

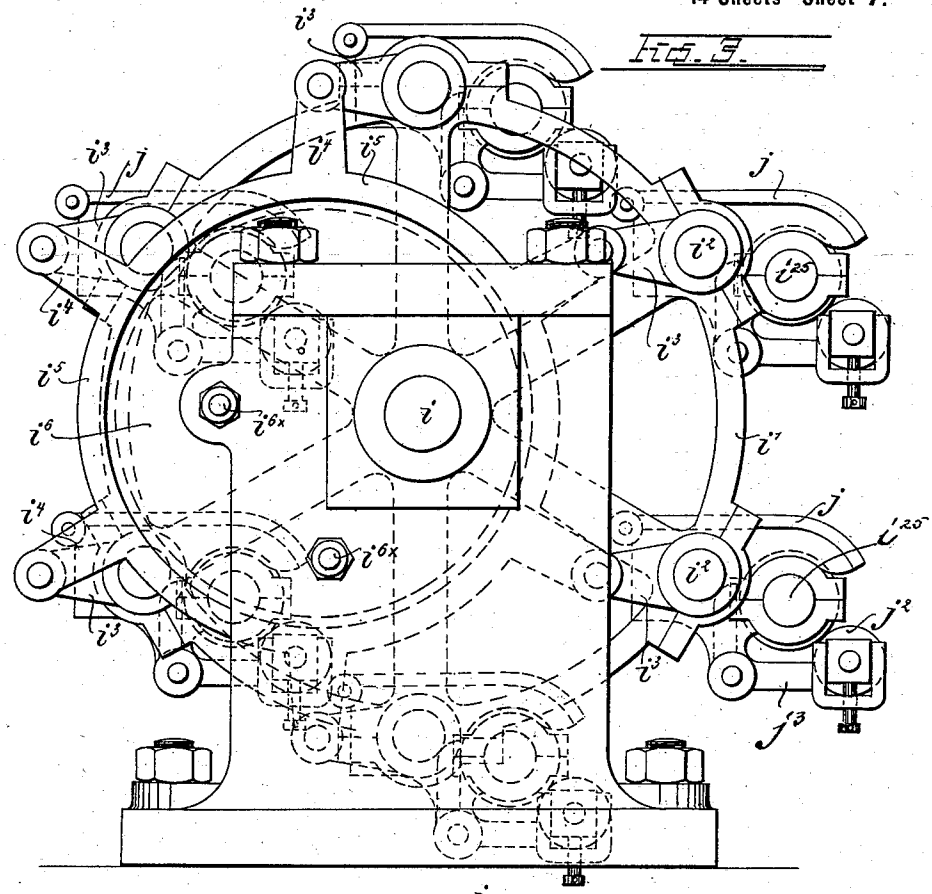

FIG. 3.

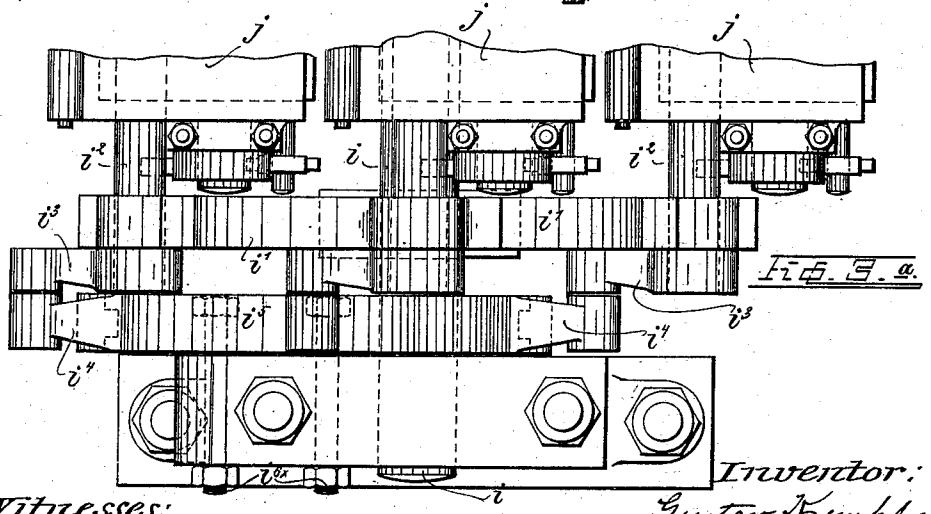

FIG. 3a.

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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 8.

Fig. 4.

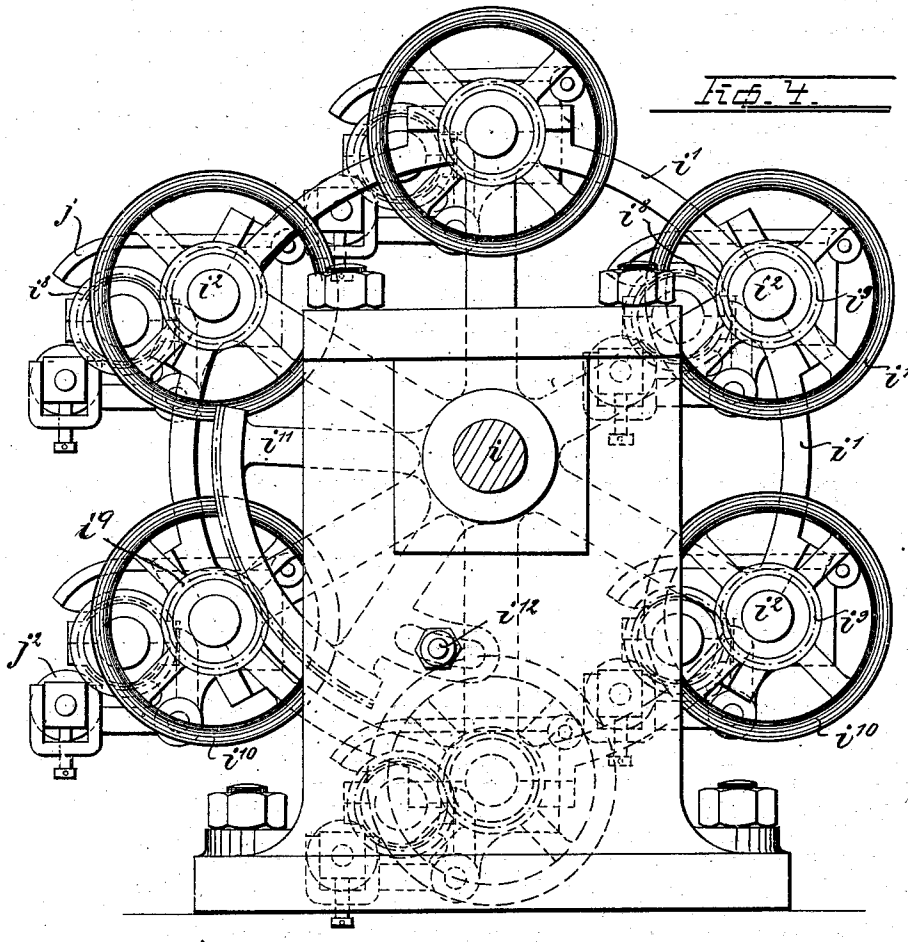
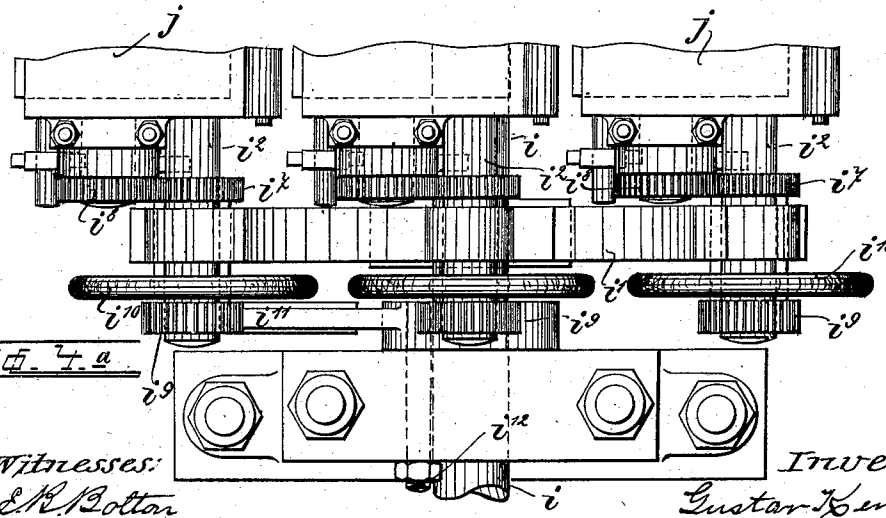


Fig. 4a.



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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.)

14 Sheets—Sheet 9.

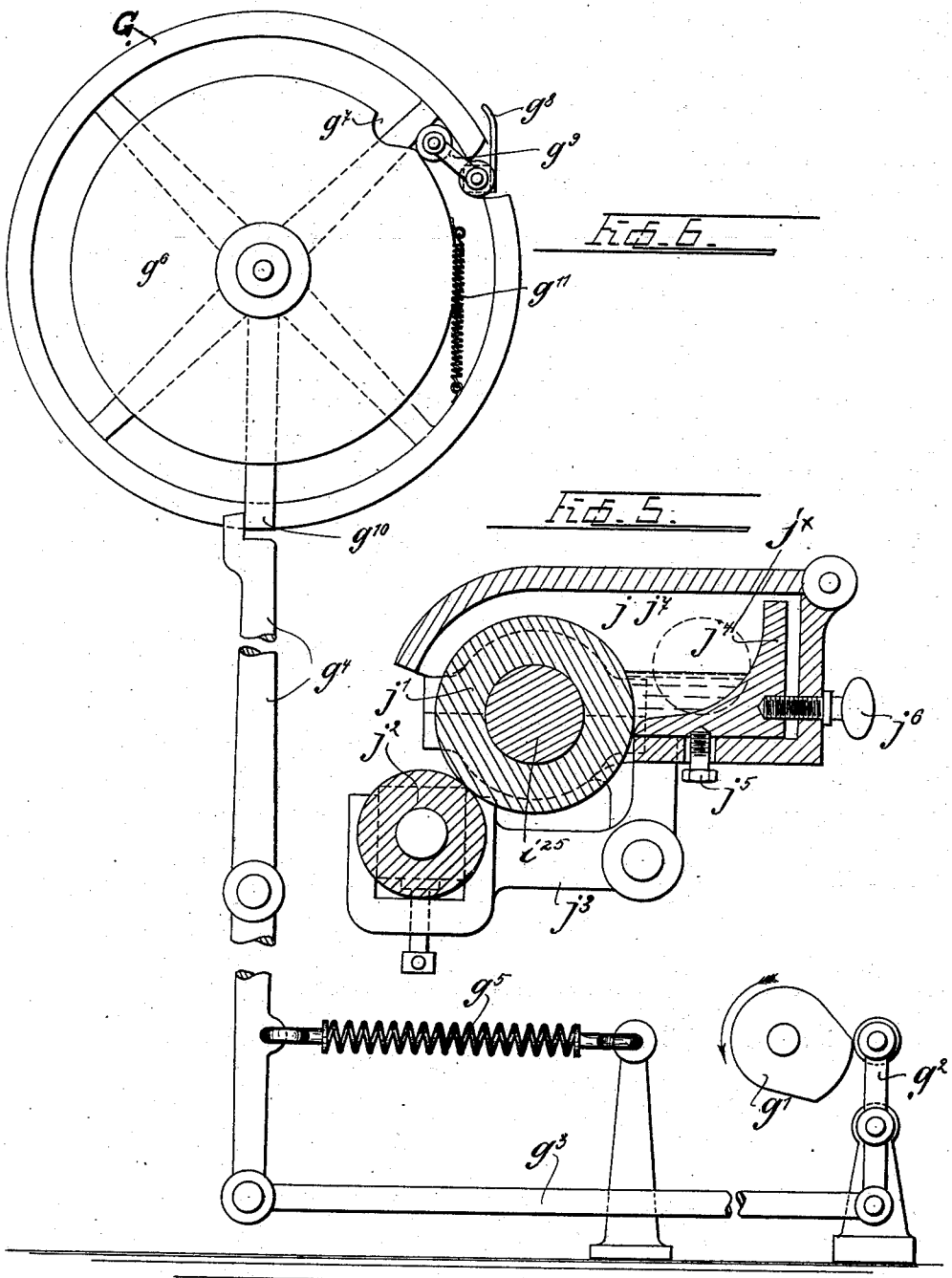

FIG. 6.

FIG. 5.

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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 10.

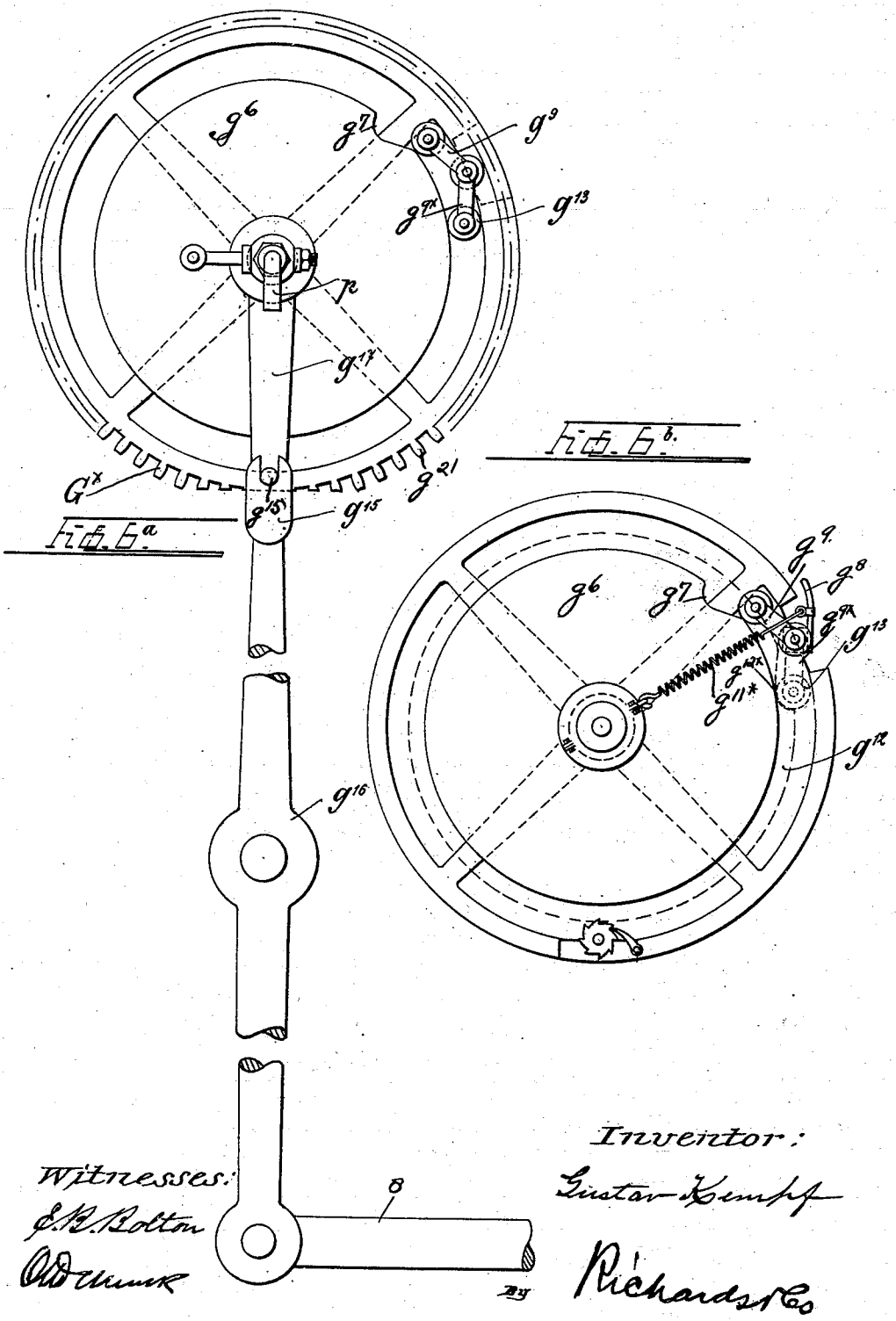

Fig. 6a.

Fig. 6b.

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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 11.

Fig. 7.

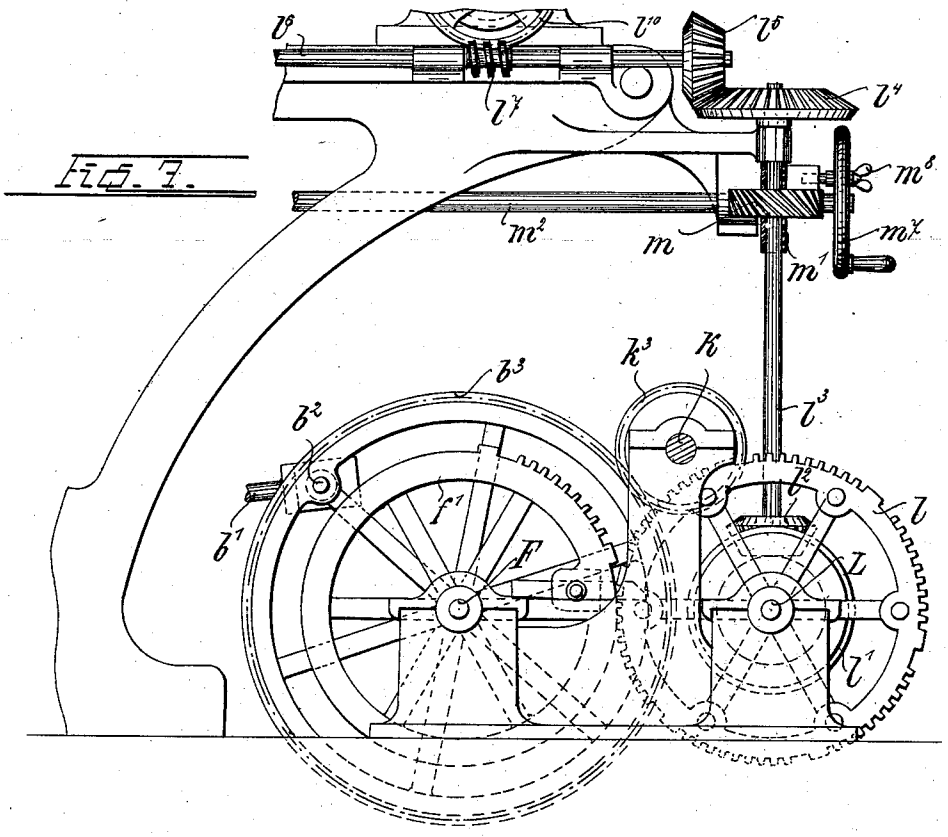
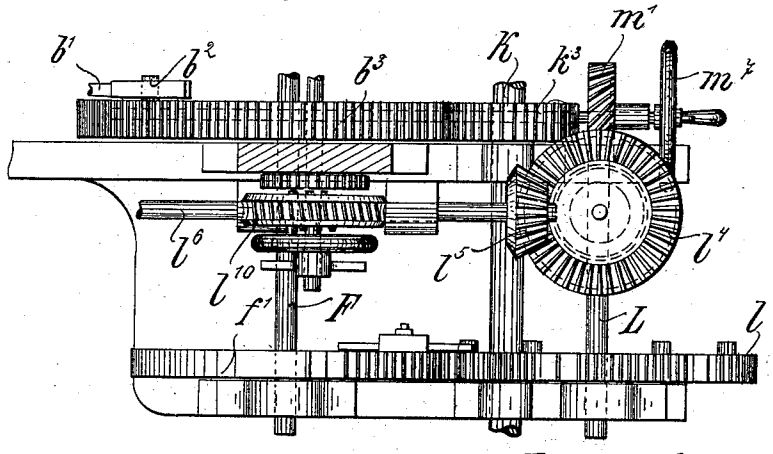


Fig. 7a.



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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 12.

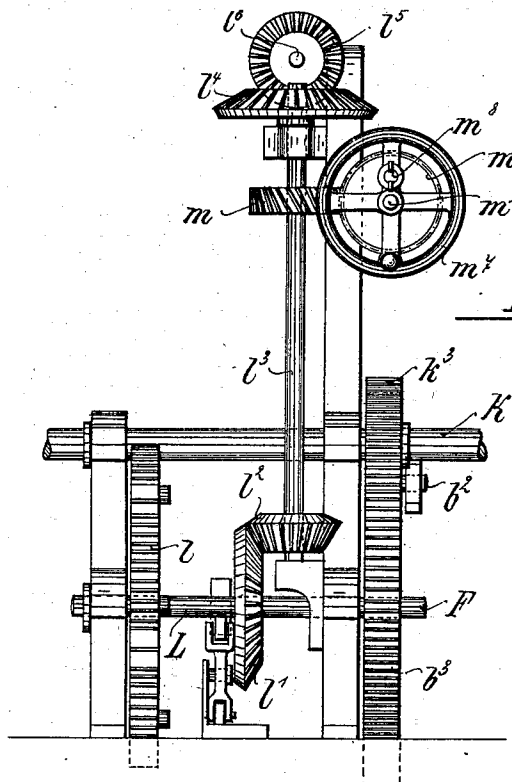

Fig. 7a.

Fig. 8.

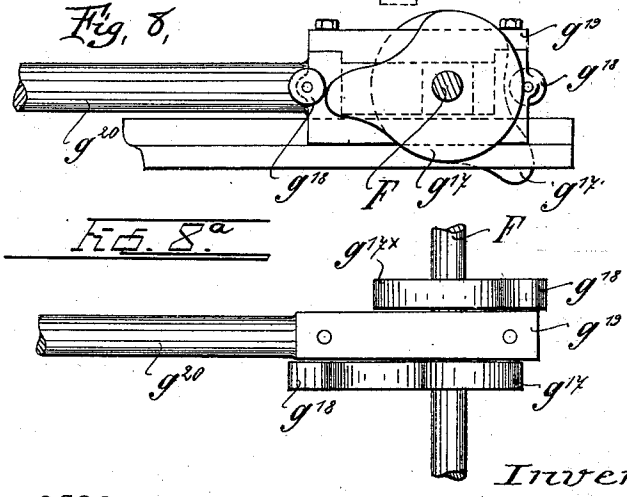

Fig. 8a.

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(No Model.) 14 Sheets—Sheet 13.

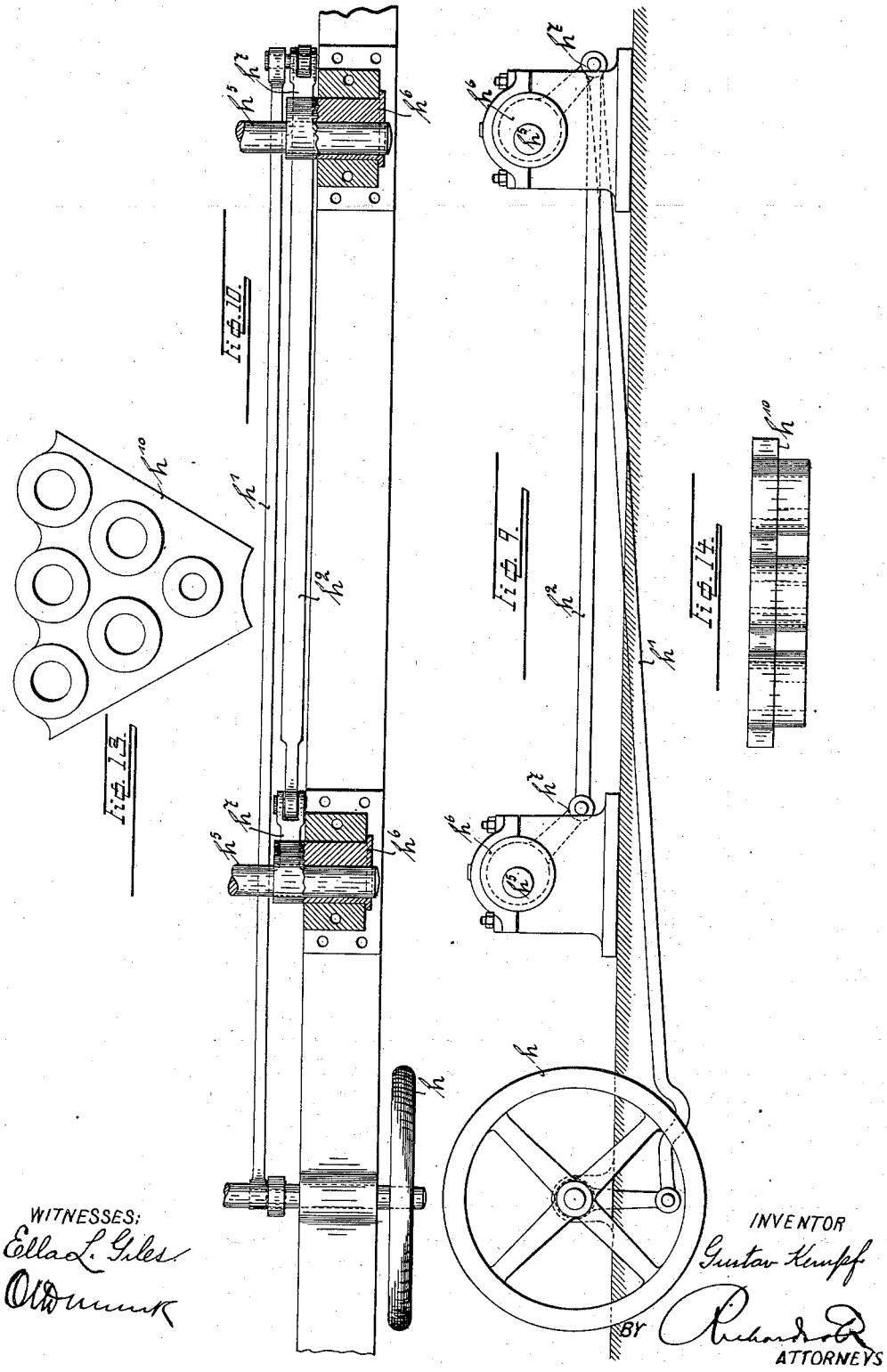

Fig. 10.

Fig. 13.

Fig. 9.

Fig. 14.

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No. 651,971. Patented June 19, 1900.

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MULTICOLOR PRINTING PRESS.

(Application filed Dec. 19, 1898.)

(No Model.) 14 Sheets—Sheet 14.

Fig. 12.

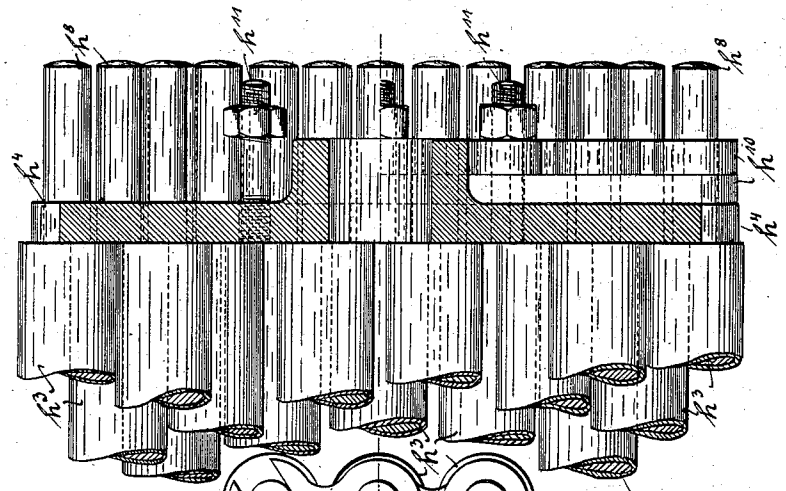
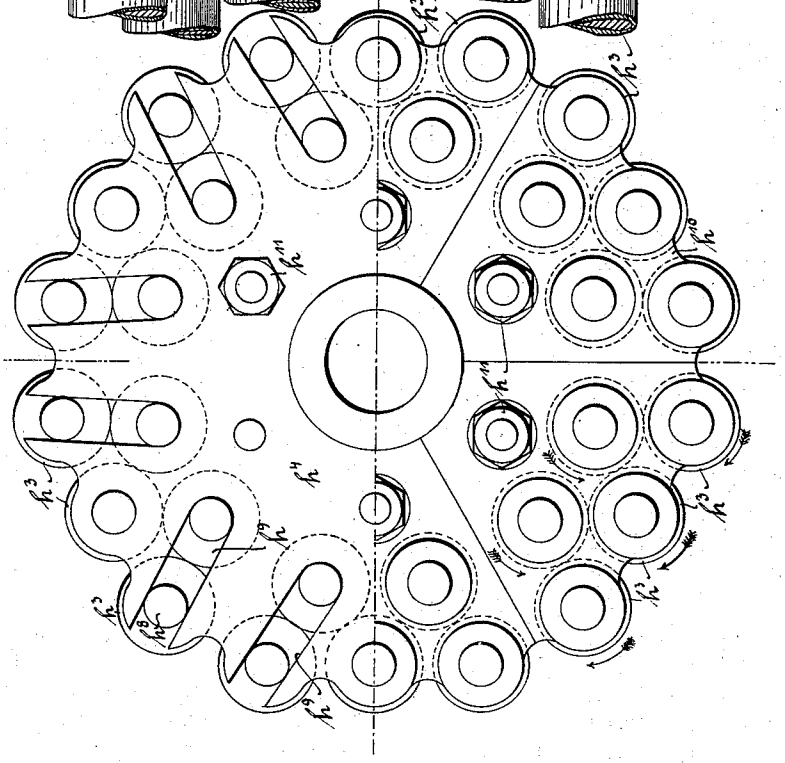


Fig. 11.



WITNESSES:
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INVENTOR
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BY
Richardson & R
ATTORNEYS

UNITED STATES PATENT OFFICE.

GUSTAV KEMPF, OF ST. MARIE, AUX-MINES, GERMANY.

MULTICOLOR-PRINTING PRESS.

SPECIFICATION forming part of Letters Patent No. 651,971, dated June 19, 1900.

Application filed December 19, 1898. Serial No. 699,739. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV KEMPF, a subject of the Emperor of Germany, residing at St. Marie, Aux-Mines, Alsace, Germany, have invented certain new and useful Improvements in Multicolor-Printing Presses, of which the following is a full, clear, and exact specification.

The present invention relates to an improved automatic multicolor-printing press adapted for lithography, photo-engraving, or ordinary printing, the object being to provide a press adapted for printing in six colors and to be used for printing in any number of colors in successive series by decreasing or increasing the number of stone boxes or beds and the printing and inking mechanisms. I have also aimed to provide a press in which the sheet which receives the impressions does not leave the machine before all colors are printed and is dry when taken down, and in which the man at the press need only to put in and take down the sheet, all other manipulations being accomplished automatically by the machine; the gearing-actuating and working mechanisms for the form-cylinder, the inking-table, the inking and the wiping rollers, and the inking work being arranged to bring these parts of the press automatically into the proper position for the impression of the next color after the impression of the preceding one. I have also made provision for adjusting or turning these parts independently of the gearing arrangement by hand.

The invention consists both in the general total construction of the machine and in the particular devices for throwing the printing-cylinder into and out of gear, the arrangements of the inking mechanism and the mechanisms for the actuating and exchanging of the parts entering into action at every new color-printing.

Figures 1, 1^a, and 1^b of the accompanying drawings taken together are a side elevation of the machine. Figs. 2, 2^a, and 2^b are together a plan view of the same. Figs. 3 and 4 are detail end views of the inking mechanism. Figs. 3^a and 4^a are plan views of a portion of the mechanism shown in Figs. 3 and 4. Fig. 5 is a detail showing one of the ink-troughs or color-boxes in longitudinal section. Figs. 6 and 6^b show the mechanism for opening and closing the gripper on the impression-cylinder, and Fig. 6^a shows the mechanism for catching the impression-cylinder after each completed impression. Fig. 7 is a front view, Fig. 7^a an end view, and Fig. 7^b a plan, of the actuating and changing mechanism for the parts operating after each color impression. These figures show, moreover, the means for the independent displacement of the stone-bed cylinder and the inking-table. Figs. 8 and 8^a show in elevation and plan the eccentric for actuating the mechanism shown in Fig. 6^a. Figs. 9 and 10 show, respectively, a diagram and a ground plan view, partly in section, of the means for raising the inking and wiping rollers. Figs. 11 and 12 show in diagram and in transverse section one of the disks serving to journal the inking and wiping rollers with the cylinders and sector-shaped auxiliary journaling-plates. Figs. 13 and 14 show the auxiliary journaling-plate.

The multicolor-press has a bed-plate A with two tracks A′, on which five coupled carrying-rollers B′ move, which carry the carriage B. This carriage carries two hexagonal cylinders D and E, which are rotated upon their axes by means of a shaft and worm and a worm-wheel, D being the form-cylinder and E the inking-table. Six stones, zinc plates, or printing-forms 1 to 6, which can be adjusted in their height by screws *d*, are set into the form-cylinder. The inking-table E carries also plates 1 to 6, which are secured by tension-screws *e* and adjusted thereby to the required degree.

B^3 represents a table situated at the upper part of the frame of the color-printing press, on which the printed sheets released from the printing-cylinder can be placed.

The movement of the carriage B with the two hexagonal cylinders D and E is effected by two toothed wheels *b*, which engage simultaneously in toothed tracks of the plate and the carriage. The toothed wheels *b* are connected by the pitman-rods *b′* and the crank-pins b^2 with the two gear-wheels b^3, mounted each on an auxiliary gearing-shaft F. The two gear-wheels b^3 produce with every rotation of the shaft F one reciprocation of the carriage B.

G is the impression-cylinder, and G′ the sheet-feeding board. The impression-cylin-

der is provided at each extremity with a spur-gear $G^{\times}$, by which it rolls on the toothed tracks B^2 of the carriage in its travel to and fro. This cylinder is provided with a hollow axis, through which the cylinder may be heated by means of gas. It has also a sheet-gripping device which opens and shuts automatically after each sixth color impression, so that the printed sheet can be taken down and a new sheet put in, and it is further provided with a device which catches the impression-cylinder after each single-color impression, arresting it during the time while the exchanging and inking of the form-cylinder takes place and then setting it to work again automatically.

The spur-gears $G^{\times}$ of the impression-cylinder are leveled or flattened over the whole length of the cylinder at the place where the cylinder comes to a standstill, so that the racks on the carriage B do not engage in the spur-gears of the impression-cylinder during the return of the carriage and are thus enabled to pass freely under the impression-cylinder.

The movement of opening and closing the grippers g^8 is effected by an eccentric g', Fig. 6, a lever g^2, a tension-rod g^3, a lever g^4, and a spring g^5. On the shaft or spindle of the impression-cylinder is a loose plate g^6, with a recess g^7 at its periphery, and into this cut-out portion falls the sheave or block of a small lever g^9, connected with the gripper g^8. The arm g^8 is actuated by a spring $g^{11\times}$, which tends to press it on the surface of the printing-cylinder G in order to clamp in the paper-sheet on the printing-cylinder. The arm g^9 can lift the arm in opposition to the action of the spring $g^{11\times}$, so as to release the paper sheet if its cylinder glides upward on the concentric part of the disk g^6. As soon as the eccentric g' enters into action the lever g^4 holds the disk or plate g^6 fast by engaging a shoulder g^{10}. The sheave or block of the gripper-lever runs out from the recess g^7 in the further revolution of the impression-cylinder and runs upon the concentric periphery of the plate g^6, and the gripper opens in consequence. As soon as the eccentric ceases to act the lever g^4 is disengaged from the rod g^{10}, and a spiral spring g^{11} retracts the disk g^6, so that the sheave of the gripper-lever returns to the recess g^7 and the gripper closes. In order to prevent the gripper from opening during the rotation of the impression-cylinder, a disk or plate g^{12}, (see dotted lines, Fig. 6^b,) with a recess similar to the recess in plate g^6, is arranged at the other extremity of said cylinder. The sheave g^{13} of the gripper-lever falls into this recess when the gripper opens. The gripper g^8 has on this extremity of the cylinder a block or roller g^{13}, intended to fall into a cut-out $g^{12\times}$. When the impression-cylinder is at work, the sheave or roll g^{13} glides on the periphery of the plate g^{12}. The latter is not loose, but is screwed fast on the bearing-supports of the impression-cylinder.

The arrangement for catching the impression-cylinder after each impression and for starting the same before each new impression, consists of a crank g^{17} set on the axle of the impression-cylinder with pins g^{15}, Fig. 6^a, and a double-armed lever g^{16} with fork-shaped extremity in which the pin g^{15} rests. When the crank and the lever assume the direction of a straight line, (see Fig. 6^a,) the spur-gear $G^{\times}$ of the impression-cylinder is disengaged from the rack B^2 of the carriage B and the impression-cylinder is arrested; but when the lever g^{16} is moved to the right or left the spur-gears of the impression-cylinder engage in the racks B^2 of the carriage B. The lateral movement of the lever g^{16} serves only to start the rotation of the impression-cylinder. Two eccentrics g^{17} g^{17}, Figs. 1 and 8, which actuate a slide-block g^{19}, provided with two rolls g^{18}, and which are set on the auxiliary gearing-shaft F, serve to move the lever g^{16} through connecting-rod g^{20}.

H H′ designate the wiping and inking-rollers. They rest in two sheaves or disks h^4, journaled in one shaft, Figs. 11 and 12.

For each individual color five cylinders h^3 are provided in the present case, and they are so arranged that the three front cylinders situated on one plane revolve in the direction as indicated by arrows. The pins h^8 of the rollers rest in slots h^9 of the sheaves h^4, provided at each extremity, and are held by sector-shaped plates h^{10}, which are fastened on the disks h^4 by means of screw-bolts h^{11}. The rotary movement of this cylinder system for setting the same for each individual color to be printed is effected by the principal gearing device described below by means of worms and worm-wheels, while measures are taken to revolve this cylinder system by hand independently of the gearing device. In order to elevate, if necessary, the wiping and printing rollers in such a manner that they cannot touch the color-plates, the following arrangement is provided: Near the printing-cylinder a hand-wheel h is journaled, Figs. 1, 9, and 10, which is connected with a connecting-rod h'. The axles h^5 of both roller systems H H′ rest eccentrically in pillow-bushes h^6, which are of one piece with one arm h^7 each. Both arms h^7 are connected with each other by a rod h^2, while the one arm h^7 is linked with the one extremity of the connecting-rod h'. This arrangement allows a simultaneous ascent or descent of the axles h^5 of the cylinder system H H′ by a distance equivalent to the distance of the geometrical axes of h^5 and h^6. For this purpose the hand-wheel h must be turned in the one or the other direction.

I designates the inking or color system. It consists of a shaft i, with two plates i' i', Figs. 3 and 4, fixed at the extremities thereof, said disks or plates carrying six color-boxes or ink-troughs j of the interior arrangement

shown in Fig. 5. The color-boxes rest in the plates i' i' by means of round pins or axles i^2. The pins at one side of the inking or color system carry each a small lever i^3, which is linked to one of the six arms i^4 of an annular band i^5. The pins i^2, arranged at the other side of the inking or color system, carry loose cog-wheels i^7, Figs. 4 and 4^a, each of which engages a cog-wheel i^8, set stationary on the shaft i^{25} of the color-box, and they also carry the toothed wheels i^9 and the hand-wheels i^{10}. The toothed wheels i^7 i^9 and the hand-wheel i^{10} of each single pin i^2 form one fixed system, which makes it possible to give one independent rotation by hand to the gear. In order to impart mechanically a suitable rotation to the inking-cylinders of that color-box which shall supply ink next, a toothed wheel segment i^{11}, Fig. 4, is loosely arranged on the shaft i of the inking or color system, said segment being inserted and maintained in proper position by means of a stud-bolt i^{12}, sliding in its slot. When the inking system is set to work, the cog-wheels i^9 on the color-box pins i^2 engage successively with the stationary toothed wheel segment and receive a revolution, which they communicate to the color-box rollers.

As shown in Fig. 5, each color-box j has an ink-distributing roller j' and an ink-delivery roller j^2. The latter hangs in a movable elbow-lever j^3. The shorter arm of this angle-lever can be set by any suitable means in such a manner that the color-roller J^2 on the longer arm can press with variable pressure against the color-distributing roller j'. The color-box contains, moreover, an ink-regulating scraper j^4, which can be inserted and adjusted by screws j^5 j^6, and also a hinged lid j^7.

In order to obtain automatic change in the various parts of the multicolor-press after each color impression, a gearing and actuating mechanism of the following construction is provided. On the main shaft K, Figs. 1, 2, and 7, provided with fast and loose pulleys k k' and with fly-wheel k^2, is a gear K^3, which engages into the gear b^3 on the auxiliary shaft F. The auxiliary shaft F carries a wheel f', which is toothed on one-sixth part of its circumference. This wheel f' engages with a cog-wheel l, of equal diameter, on a second auxiliary shaft L, and the toothed circumference of this wheel is divided into six sections. Thus while the auxiliary shaft F makes one complete revolution the auxiliary shaft L rotates only by one-sixth of its circumference. The auxiliary shaft F starts the reciprocating movements of the carriage B, as described, and also the described movements of catching and starting the impression-cylinder, while the auxiliary shaft L, providing for the insertion of mechanism described hereinafter, serves the purpose of imparting an alternating motion to the form-cylinder D, the inking-table E, the wiping-rollers H H', and the inking system, so as to bring the corresponding parts for the new color impression into working position and to start the movements required for the opening of the grippers of the impression-cylinder G after the last color impression has taken place. A bevel-wheel l' is keyed on the shaft L, and this bevel-wheel engages in a bevel l^2, at the lower extremity of a vertical shaft l^3, Figs. 1, 7, 7^a, and 7^b. At the upper end of the shaft l^3 is a bevel-wheel l^4, engaging with a bevel-wheel l^5 of a horizontal shaft l^6. On the latter are the worms l^7, l^8, and l^9, below the inking system I and the wiping-rollers H H', and these worms catch into corresponding worm-wheels for gearing these parts. The transmission is such that with one-sixth revolution of the shaft L the inking system and wiping-roller system complete a sixth-revolution. Moreover, a worm-wheel m is fixed on the vertical shaft l^3, and this worm-wheel engages another worm-wheel m' of the same diameter. The worm-wheel m' is mounted on a horizontal shaft m^2, which carries two worms m^3 m^4, which engage with the worm-wheels m^5 m^6 on the axles of the form-cylinder D and the inking-table E. This worm-gearing is arranged in such a manner that one-sixth rotation of the shaft L causes one-sixth revolution of the form-cylinder and of the inking-table. This worm-wheel m' is loosely arranged on the shaft m^2, while a hand-wheel m^7 is fixed on the extremity of the shaft. This hand-wheel can be brought into fixed connection with the worm-wheel m' by a bolt and nut m^8. When the bolt is turned out from the worm-wheel m', the latter can only rotate loosely on the shaft m^2, and the operator is enabled to turn the shaft by means of the hand-wheel, thus imparting to the stone-bed cylinder and the inking-table a movement independent of their gearing mechanism.

The possibility of revolving the form-cylinder and the color-table independently of the general gearing mechanism is of particular advantage when new forms are set into the cylinder or when printing irregularities shall be corrected without the necessity of actuating other parts of the printing-press.

The throwing of the machine out of gear is effected by the hand-lever n, which connects with the belt-shifter by means of the shaft n', the bevel-wheels n^2 n^3, the shaft n^4, bevel-wheels n^5 n^6, shaft 7, and bevel-wheels n^8 n^9. In Figs. 1 and 2 a brake is shown, the brake-shoe o' of which is pressed against the fly-wheel k^2 by means of the rod o by pressing down the rod p, so that the machine can be stopped almost instantaneously, if necessary.

The mode of action of the gearing arrangement described is briefly as follows: Fig. 1 shows the position of the multicolor-press after it has executed the last impression. Then the mutation in the various parts of the press must take place in order to execute the first impression—that is, to bring forward the form-bed No. 1, the color-table No. 1, the corre-

sponding inking and wiping rollers and the corresponding ink-fountain. The gear k^3 and the fly-wheel k^2 revolve in the direction of the arrow and produce an opposite rotation of the gear b^8 and the segment-wheel f', which latter turns the segment-wheel l. During this time the stone-bed cylinder and the inking-table cylinders are turned by means of the bevel-wheels l' l^2 of the worm-wheels m m' and the shaft m^2 with the worms and worm-wheels. The revolution of these parts lasts while the segment-wheel f' acts upon the segment-wheel l. The inking system and the wiping and inking rollers are likewise turned by bevel-wheels l^4 l^5, shaft l^6, and engage with worm-wheels in a corresponding measure. During this operation of the driving or gearing mechanisms the inking system I and the wiping and printing roller systems H H′ have revolved by one-sixth of their circumference, thus being placed into the position in which they operate in common with the corresponding form and color tables. In this revolution of the inking system the revolution of the next operating ink-distributing roller j' has taken place, inasmuch as the toothed wheel i^9, belonging thereto, has unwound on the toothed sector i''. In that operation the ink has been transferred from the ink-box to the color-distributing roller j^2, so that this roller gives or yields ink to the corresponding color-table E, passing beneath it. In the forward movement of the carriage B the color delivered by the roller j^2 to the color-table E is distributed by the rollers of the group H′ on the color-table. This table yields its color to the corresponding rollers of the group H, which put it on the corresponding form of the cylinder D at the return movement of the carriage B. The two cylinders D and E execute their one-sixth revolution before they come into contact, respectively, with H and with H′ and I. The contact of D with H and of E with H′ and I thus takes place twice for the individual ink-deliveries—once in the forward travel, when the printing-cylinder is at rest, and once in the backward travel, when the printing-cylinder moves. In this operation the roller system H inks the form-bed D with the color to be printed, while the inking device I supplies the color-table E with the next color to be printed.

To execute the impressions successively, it is necessary that the impression just made should always dry immediately. To accomplish this purpose, a gas heating device or conduit p is provided, by means of which each impression is dried immediately. Hence no sheets will be smudged, and the finest chromotype work can be executed on this machine.

The damping-rollers M, situated behind the printing-cylinder D, are intended to moisten each form of the form-table D at its advance, so that the color is distributed uniformly on the form by the rollers H. Three such rollers are represented, of which the upper one is fed with liquid in the usual manner, said upper rollers feeding it to the two lower rollers, which transfer it to the form.

Having thus described my invention, what I claim is—

1. A multicolor-printing machine comprising a form-cylinder D, a color-table E, inking and wiping rollers, H, H′ and an inking system I having multiple sections corresponding to the number of colors to be printed, means for giving said parts a step-by-step rotation to bring the next color-printing sections into working position after the operation of one set of single-color-printing sections, an impression-cylinder coöperating with said parts, grippers for holding the sheet to the impression-cylinder, and means for causing said grippers to hold the sheet to the impression-cylinder until the last color of the set is printed substantially as described.

2. In a multicolor-printing machine, the combination with the reciprocating bed having a plurality of surfaces adapted to be brought successively into printing position, of a color-feeding device comprising the rotary plates, the series of troughs supported upon pins or axles journaled in said plates, arms projecting from said axles, a stationary eccentric, and a strap encircling said eccentric and linked to said arms for maintaining said troughs in a horizontal position substantially as described.

3. In a multicolor-printing machine the combination with the form-cylinder, color-table, and inking and wiping rollers arranged in sets of means for shifting said parts to print the successive colors comprising a driving-segment, a driving-wheel having its periphery divided into as many segments as there are colors to be printed and adapted to be operated by said driving-segment, and operating connections from said driving-wheel to the parts to be operated, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GUSTAV KEMPF.

Witnesses:
T. RANNIE,
T. URNER.