No. 683,162. Patented Sept. 24, 1901.

W. G. & R. A. A. WHITE.

MACHINE FOR POLYCHROMATIC PRINTING.

(Application filed Feb. 12, 1901.)

(No Model.) 3 Sheets—Sheet 1.

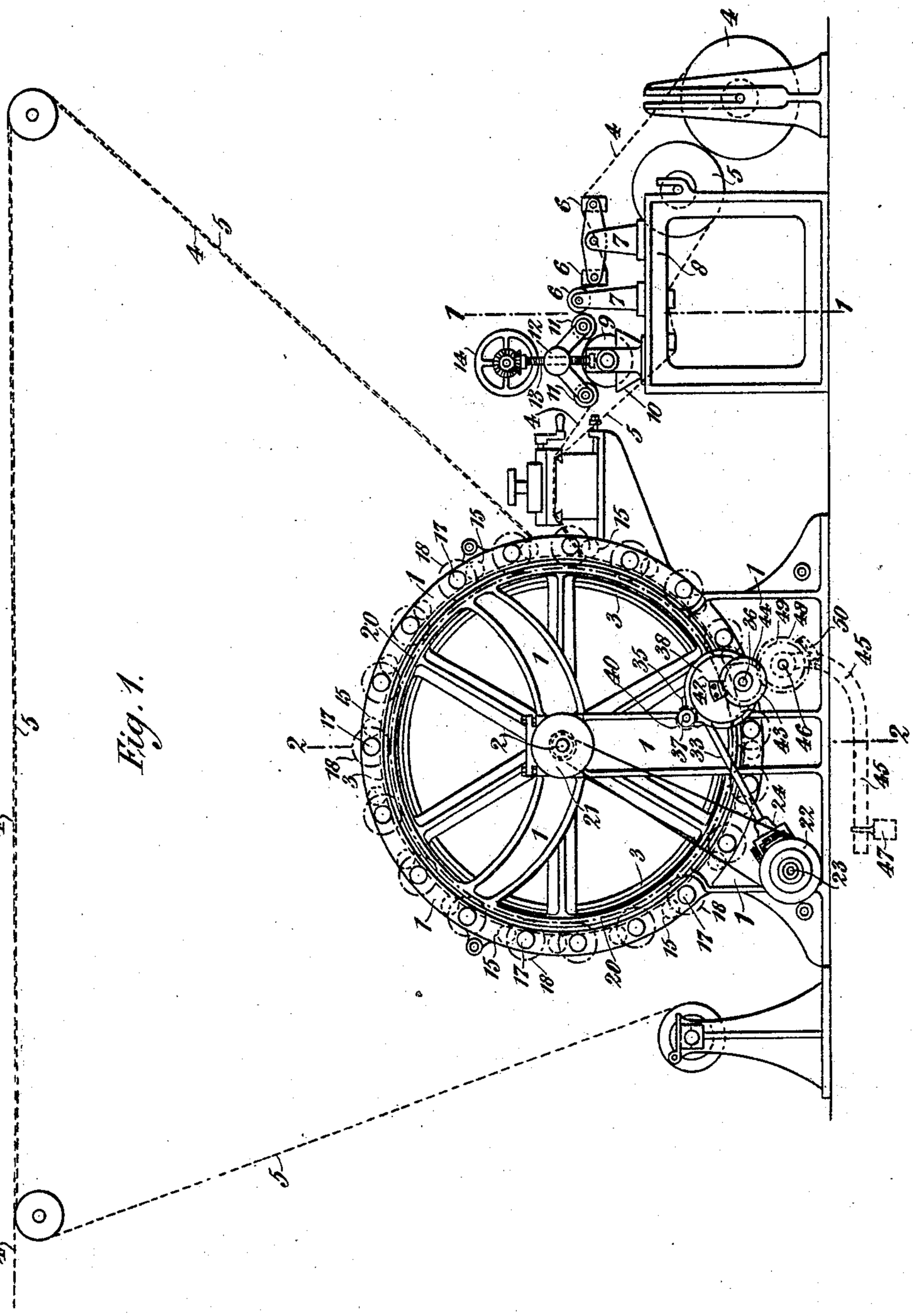

Fig. 1.

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Fig. 1ª.

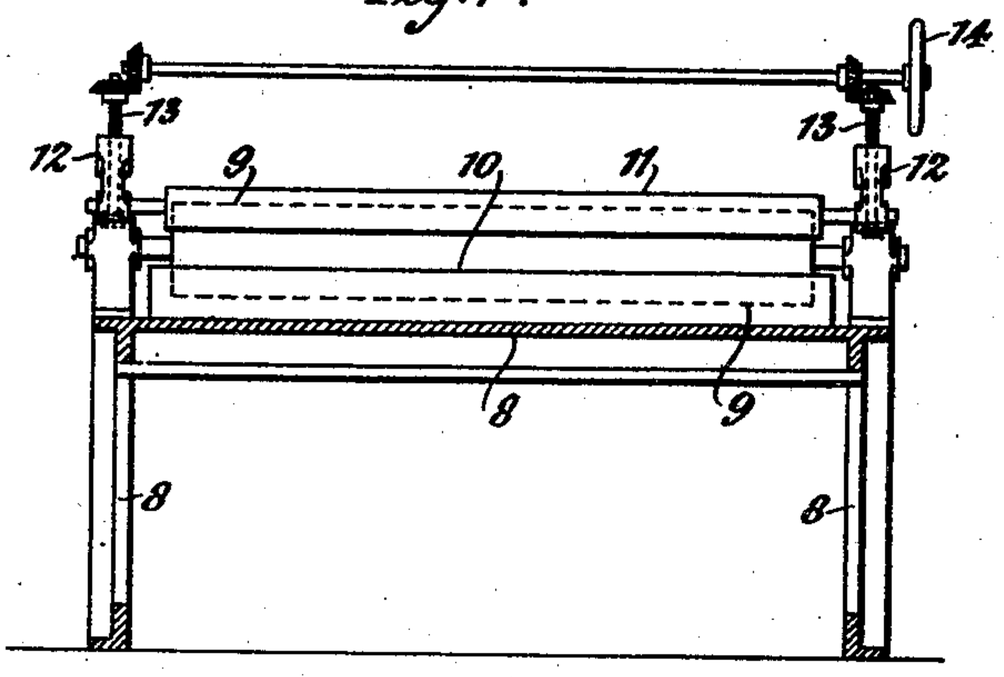

Fig. 2.

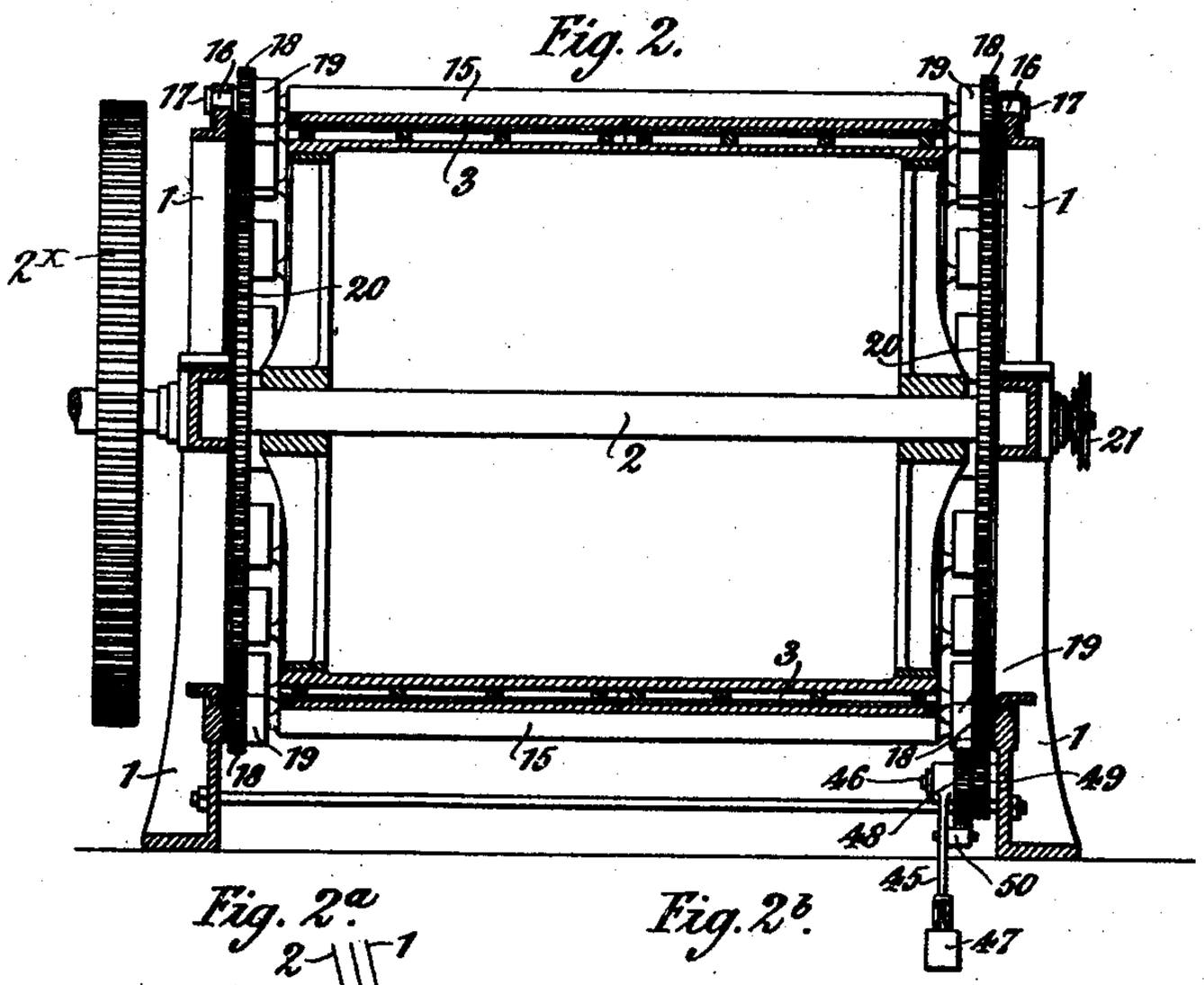

Fig. 2ª.

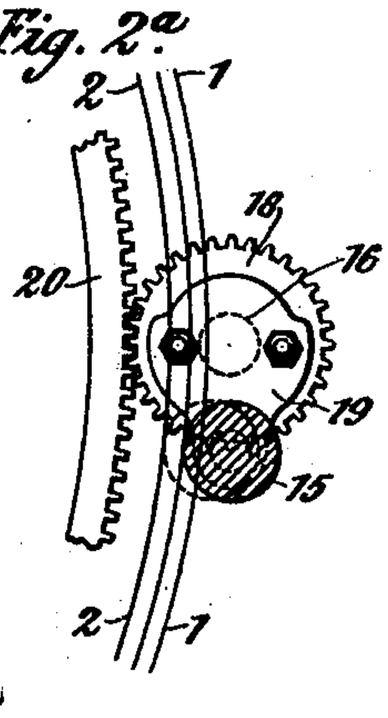

Fig. 2ᵇ.

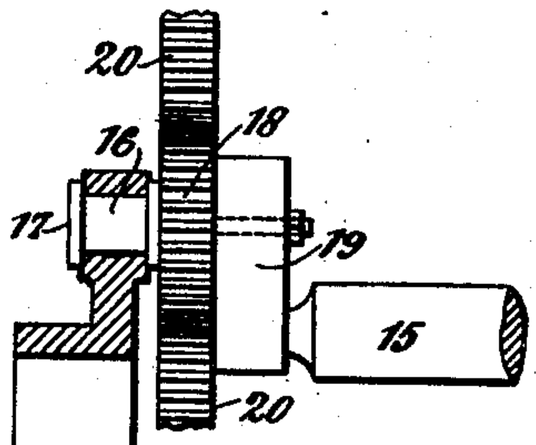

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Fig. 3.

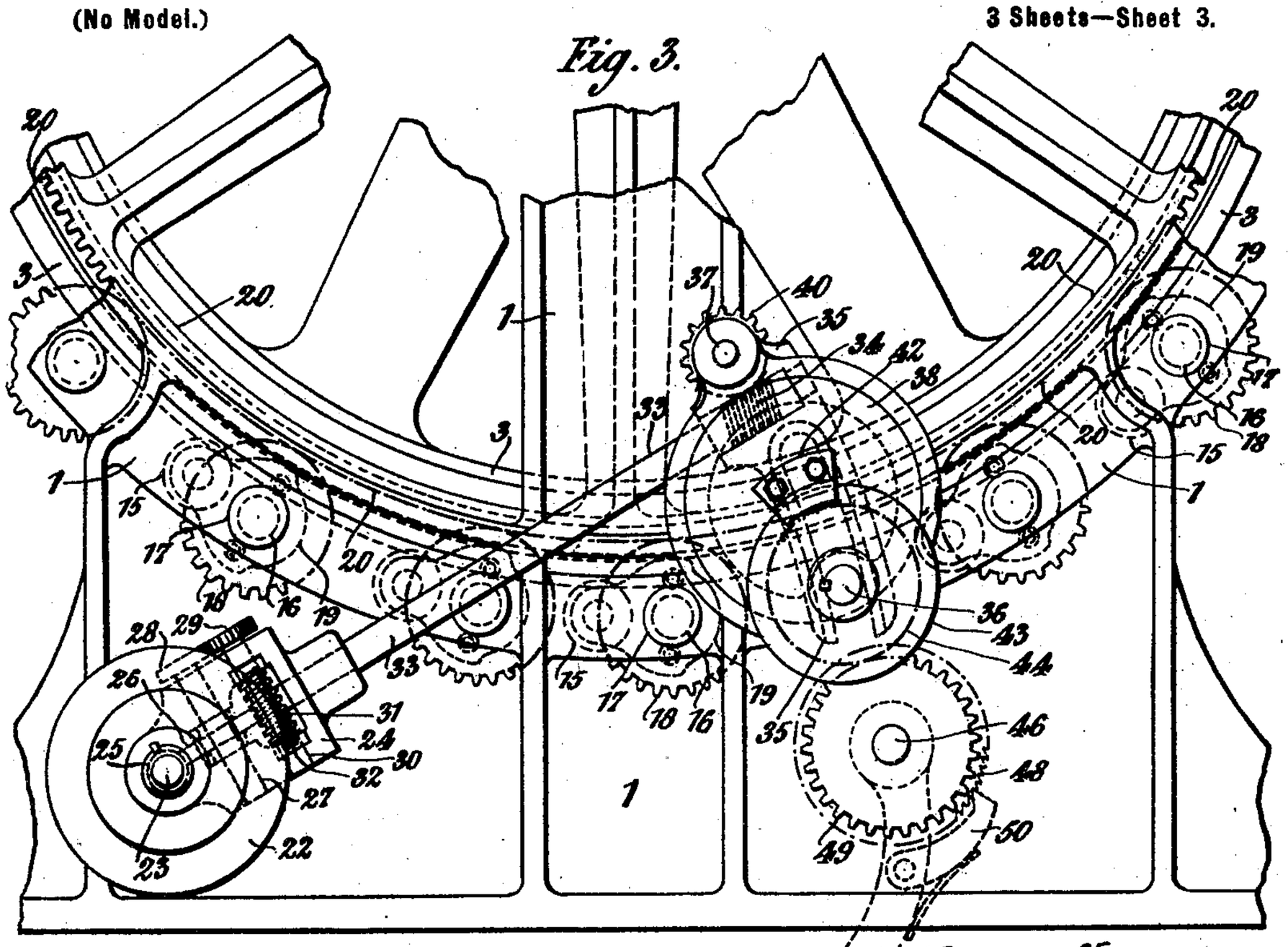


Fig. 7.

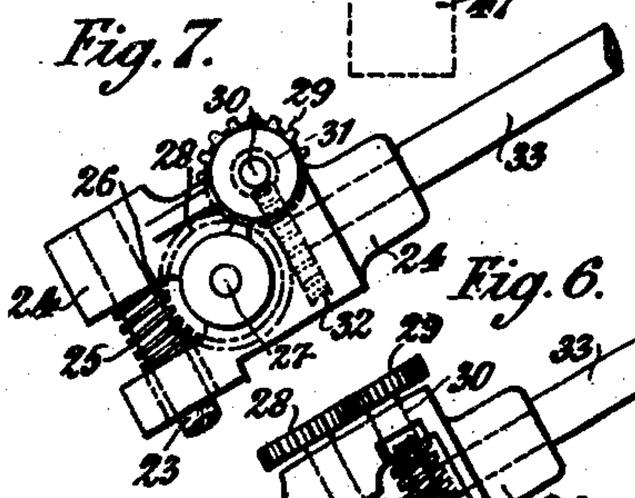


Fig. 6.

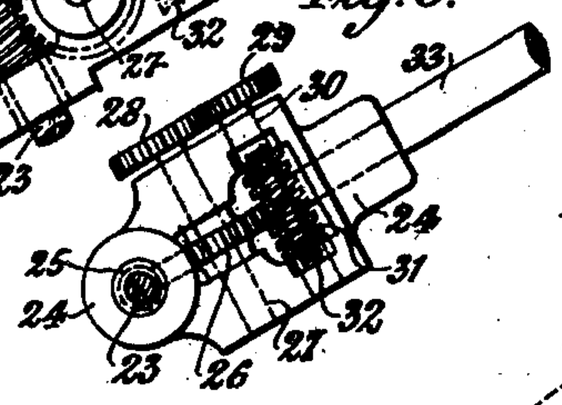


Fig. 4.

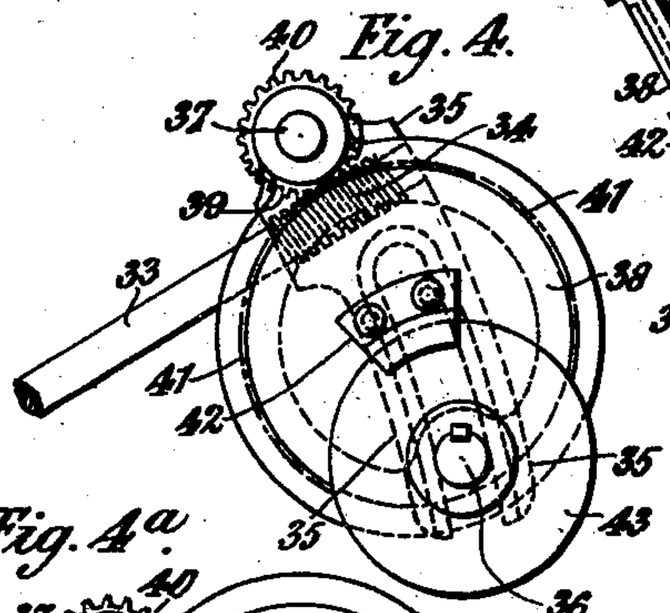


Fig. 5.

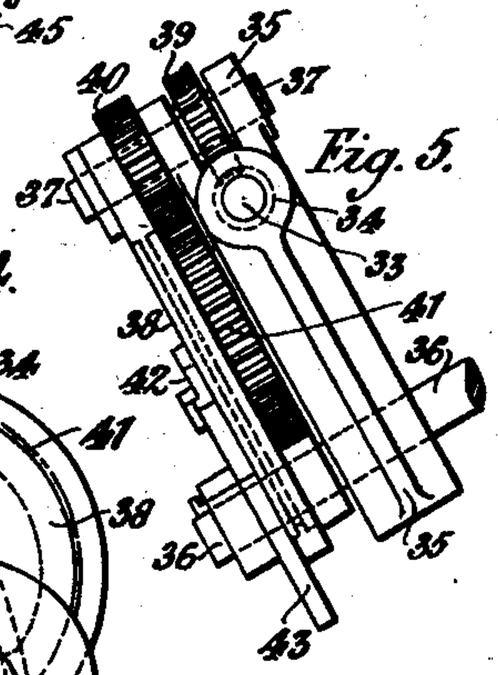
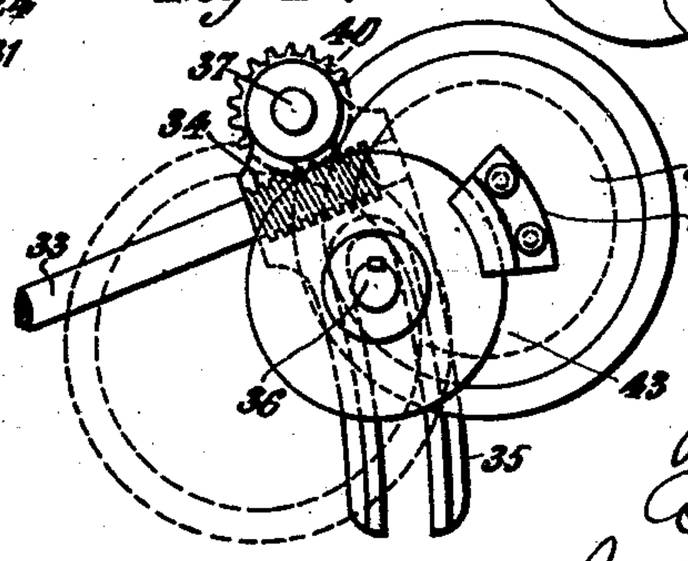


Fig. 4a.



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UNITED STATES PATENT OFFICE.

WILLIAM GEORGE WHITE, OF ANERLEY, AND ROBERT ALFRED ALBERT WHITE, OF ROTHERHITHE, ENGLAND.

MACHINE FOR POLYCHROMATIC PRINTING.

SPECIFICATION forming part of Letters Patent No. 683,162, dated September 24, 1901.

Application filed February 12, 1901. Serial No. 46,984. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM GEORGE WHITE, engineer, residing at Thurlow House, Weighton road, Anerley, and ROBERT ALFRED ALBERT WHITE, engineer, residing at 14 Gomm road, Rotherhithe, in the county of Surrey, England, subjects of the King of Great Britain, have invented a certain new and useful Machine for Polychromatic Printing, of which the following is a specification.

This invention relates to the well-known polychromatic printing in which solid blocks or sheets of composition containing the colors or dyes are employed. We cut or form the composition in the designs required according to the lengths of the repeats. The blocks of color or type are made from two to six inches thick. The blocks of color are then cut into sheets of the required thickness. Say, for instance, the repeat of a design is one yard square, we should split or cut the blocks into six sheets, place them end to end on a suitable slab of wood covered with glazed cloth, and the sheets of color are joined in one length, thus forming a sheet of color eighteen feet in length. The slab carrying the sheet of color thus joined is then placed on a frame or chute and lowered by any suitable means onto the top of the cylinder of the printing-machine. The cylinder is made to slowly rotate, the glazed cloth being carefully removed as the color composition adheres to the cylinder. The ends of the slab of color are made to butt and are then joined together, forming an endless band of color six yards in circumference. After many experiments we have found that the composition adheres with great tenacity to metal, particularly iron. The cylinder we mount in bearings in a suitable framework, which also carries the bearings for a number of pressing-rollers placed around the printing-cylinder at suitable distances apart. At one side of the cylinder or in any other suitable position is mounted a paring-knife in a slide-rest. This knife before the printing is commenced is brought into position against the surface of the design composition and the printing-cylinder is caused to turn, by which means the surface of the composition is turned or cut perfectly true. The knife is then removed. The design surface being now ready for printing, the fabric or other material to be printed is batched or wound on reels suitably carried by framing in front of the machine. Before passing to the printing composition the fabric is damped with turps or any other suitable solvent, for which purpose it passes over a damping-roller supplied with the damping liquid from a suitably-arranged trough. The fabric is pressed onto the damping-roll by a pair of rollers, one on each side, whose height can be adjusted so as to regulate the amount of damping liquid applied to the fabric. The fabric is then passed between the printing-cylinder and pressing-rollers, where it receives the impression.

Figure 1 is a side elevation of a machine constructed according to our invention. Fig. 1[a] is a section on the line 1 1, Fig. 1, showing the damping apparatus. Fig. 2 is a section on the line 2 2 of Fig. 1, and Figs. 2[a] and 2[b] show details. Fig. 3 is a side elevation of the lower portion of the machine to a larger scale. Figs. 4, 4[a], 5, 6, and 7 show details of the mechanism for automatically feeding up the pressing-rolls as required. Fig. 4 shows the position at half-stroke of the eccentric for equalizing the action of the pressing-rolls. Fig. 5 is an edge view of the eccentric at half-stroke. Figs. 6 and 7 show in side and plan views the arrangement of gearing employed for transmitting motion to the eccentric.

Referring now to Figs. 1 and 2, 1 1 are two side frames of convenient shape, which are bolted together by stay-rods. Between these side frames and keyed upon a shaft 2 is a cylinder 3, the shaft 2 being supported in bearings in the side frame 1 and having fixed to it a toothed wheel 2[x], which is driven in any convenient manner.

4 is the roll of material to be printed, and 5 is a roll of back-cloth, so arranged that it passes over the back of the material to be printed and prevents the color from the rollers from printing on the back of the printed cloth. The cloth from the roller 4 is led over and under tension bars or rollers 6, mounted in bearings in bracket-supports 7, bolted to the frame 8. The fabric 4 to be printed is led, as shown by the dotted line in Fig. 1, over the damping-roller 9, running in the

trough 10, containing the damping liquor or spirit. The pressure of the fabric on the damping-roller is regulated by the two rollers 11, suspended from nuts 12, which can be raised or lowered by the screws 13, turned by the hand-wheel 14. The cloth then passes over the bed of the knife-rest and then successively under the pressure-rollers 15. The pressure-rollers 15 are mounted eccentrically to short shafts 16, as shown in Figs. 2, 2ª, and 2ᵇ, which are gradually rotated, so as to bring the rollers forward as the work proceeds. The shafts 16 work in bearings in the side frame 1, and each shaft is formed with a collar 17, which bears against the outside of the frame 1. Pinions 18, fixed to the shafts 16, have bolted to them plates 19, in which are the bearings of the rollers 15. The pinions 18 at opposite ends of the cylinder gear into spur-wheels 20, mounted loosely on shaft 2, to which a rotary motion is given, as hereinafter described, thus rotating the pinions 18, and the pressure-rollers 15 are caused to follow up the gradually-decreasing periphery of the cylinder. At the commencement of the printing operation the periphery of the roller 15 may be at, say, line 1 of Fig. 2ª, which represents the maximum thickness of coloring material the machine is capable of receiving, and the rollers will follow up the decreasing thickness of color as the printing proceeds until the line 2 is reached and the color is all used up, at which time the pressure-roller will be in the dotted position. It will be obvious that the amount of forward motion given to the pressure-rollers by the partial rotation of the pinions 18 will be different at different positions of the rollers, and therefore means must be provided to equalize this motion. To obtain this end, we have devised the following arrangement of gearing: Each spur-wheel 20 is mounted loosely on the shaft 2, to which are fixed speed-pulleys 21, driving by a band speed-pulleys 22 on a second shaft 23, turning in bearings in the frame 1 and having mounted upon it a swinging frame 24. The shaft 23 also carries a worm 25, which gears with a worm-wheel 26, mounted on a spindle 27, carried by the swinging frame 24. The spindle 27 is geared by pinions 28 and 29 with a second spindle 30, also carried by the swinging frame 24. On the second spindle is a worm 31, which gears into a worm-wheel 32, keyed on one end of a third shaft 33, which is supported in a bearing in the swinging frame 24. The other end of the third shaft 33 has a worm 34 fixed to it and works in a bearing carried by a forked frame 35, the prongs of which span a fourth shaft 36 and form a guide for the frame during its rising and falling movements, hereinafter described. The forked frame 35 carries a bearing for the end of a third spindle 37, the other end of which is supported by the strap of eccentric 38. This spindle 37 has fixed to it a worm-wheel 39, gearing with the worm 34 on the third shaft 33, and it also carries a pinion 40, gearing with a segmental rack 41, formed at the back of the eccentric 38, which is mounted loosely on the fourth shaft 36 and is connected thereto by means of a clamp 42 on the eccentric gripping the disk 43, which is keyed to the shaft 36. By this means of attaching the eccentric to the shaft the adjustment of the parts will be greatly facilitated in starting and stopping the machine, and the parts of the gearing may be readily separated and thrown out of action. The shaft 36 carries at its opposite ends a pinion 44, each of which gears with the spur-wheels 20, through which motion is communicated to shafts 16 and pinions 18. The fourth shaft 36 is mounted in fixed bearings, and as the eccentric 38 rotates the forked frame 35 and the third shaft 33 will rise from the dotted position, Fig. 4ª, to the position shown at Fig. 4, being allowed to do so by reason of the pivoting of the frame 24, to which the third shaft 33 is attached, and as the rotary motion continues will descend to the position shown at Fig. 4ª. The position of the eccentric 38 with regard to that of the pressure-rollers at the commencement of the printing operation will be best understood by reference to the enlarged view, Fig. 3, the eccentric and rollers moving in the same direction, but commencing at different points of the circle. It will be understood that by the adoption of this arrangement of gearing for communicating a continuous advancing motion to the pressure-rolls the speed of the printing-cylinder as communicated to the pulleys 22 is greatly reduced during its transmission to the fourth shaft 36 by the several worms and worm-wheels; also, that owing to the relative positions in which the eccentric 38 and the shafts 16 are set the pressure-rolls will be moved up to the color-surface at an even speed equal to the rate of consumption of the coloring material.

In order to keep the pressure-rollers up to their work and to give sufficient pressure for heavy fabrics, the following arrangement is adopted:

45 is an arm pivoted on a stud 46 and carrying a weight 47.

48 is a ratchet-wheel, and 49 a pinion, which are fixed together and mounted loose on the stud 46, the pinion 49 gearing with the pinion 44.

50 is a pawl pivoted to the arm 45 and engaging with the ratchet-wheel 48.

The pinions 44, as above described, gear with and drive the wheels 20, by which the pressure-rollers 15 are actuated, and therefore the weight 47 tends to press the rollers 15 against the fabric, and by moving the weight 47 along the arm 45 this pressure can be regulated. As the wheels 20, and consequently the arm 45, only turn through a small angle, this pressure is approximately constant.

What we claim is—

1. The combination of a printing-cylinder,

a trough for containing damping liquid, a roller in the trough, a pair of hanging frames, a pair of rollers mounted in the frames one on each side of the first roller, nuts forming part of the frames, a pair of vertical screws in the nuts, and means for turning the screws.

2. The combination of a printing-cylinder, a toothed wheel coaxial with the cylinder, a series of pinions gearing with the wheel, a series of pressing-rolls arranged around the cylinder and pivoted eccentrically to the pinions, a pinion driving the wheel, a ratchet-wheel fixed to the pinion, a weighted arm free to rotate about the axis of the pinion and a pawl pivoted to the arm and engaging with the ratchet-wheel.

3. The combination of a printing-cylinder, a toothed wheel coaxial with the cylinder, a series of pinions gearing with the wheel, plates fixed to the sides of the pinions, a series of pressing-rolls arranged around the cylinder and pivoted to the plates eccentrically to the pinions and means for rotating the wheel.

4. The combination of a printing-cylinder, a toothed wheel coaxial with the cylinder, a series of pinions gearing with the wheel, plates fixed to the sides of the pinions, a series of pressing-rolls arranged around the cylinder and pivoted to the plates eccentrically to the pinions, a pinion driving the wheel, a ratchet-wheel fixed to the pinion, a weighted arm free to rotate about the axis of the pinion and a pawl pivoted to the arm and engaging with the ratchet-wheel.

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