(No Model.) 3 Sheets—Sheet 1.

W. H. WALDRON.

WALL PAPER PRINTING MACHINE.

No. 531,075. Patented Dec. 18, 1894.

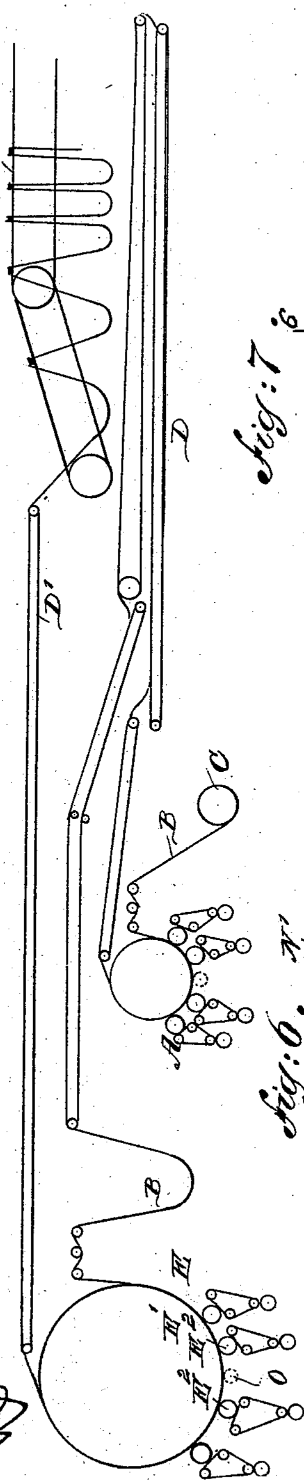


Fig: 1.

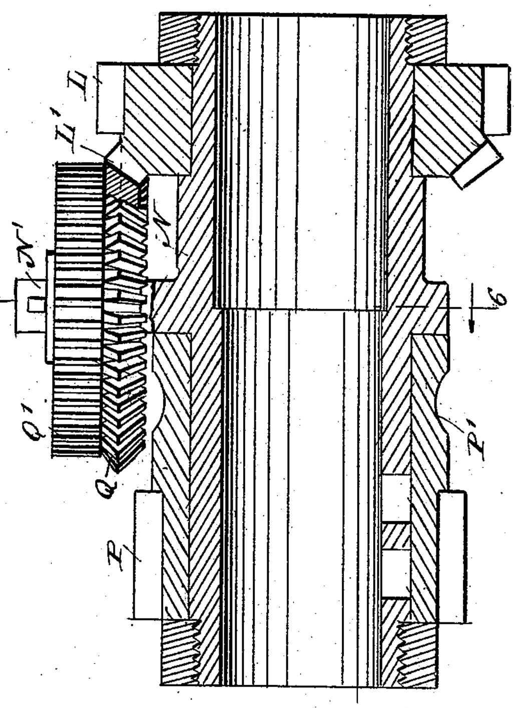


Fig: 7.

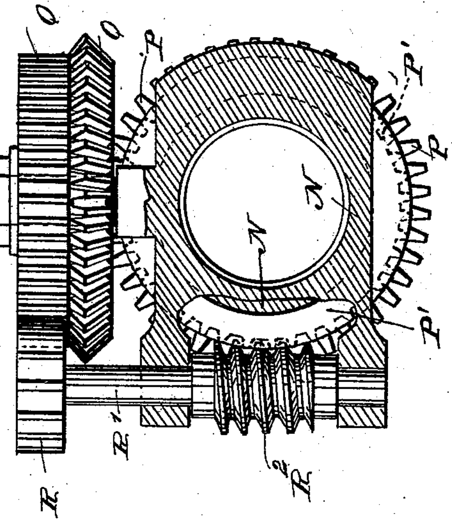


Fig: 6.

WITNESSES:

Chas. Nida

Theo. G. Hoster

INVENTOR

W. H. Waldron

BY

Munn & Co

ATTORNEYS.

(No Model.)

3 Sheets—Sheet 2.

W. H. WALDRON.

WALL PAPER PRINTING MACHINE.

No. 531,075. Patented Dec. 18, 1894.

Fig: 2.

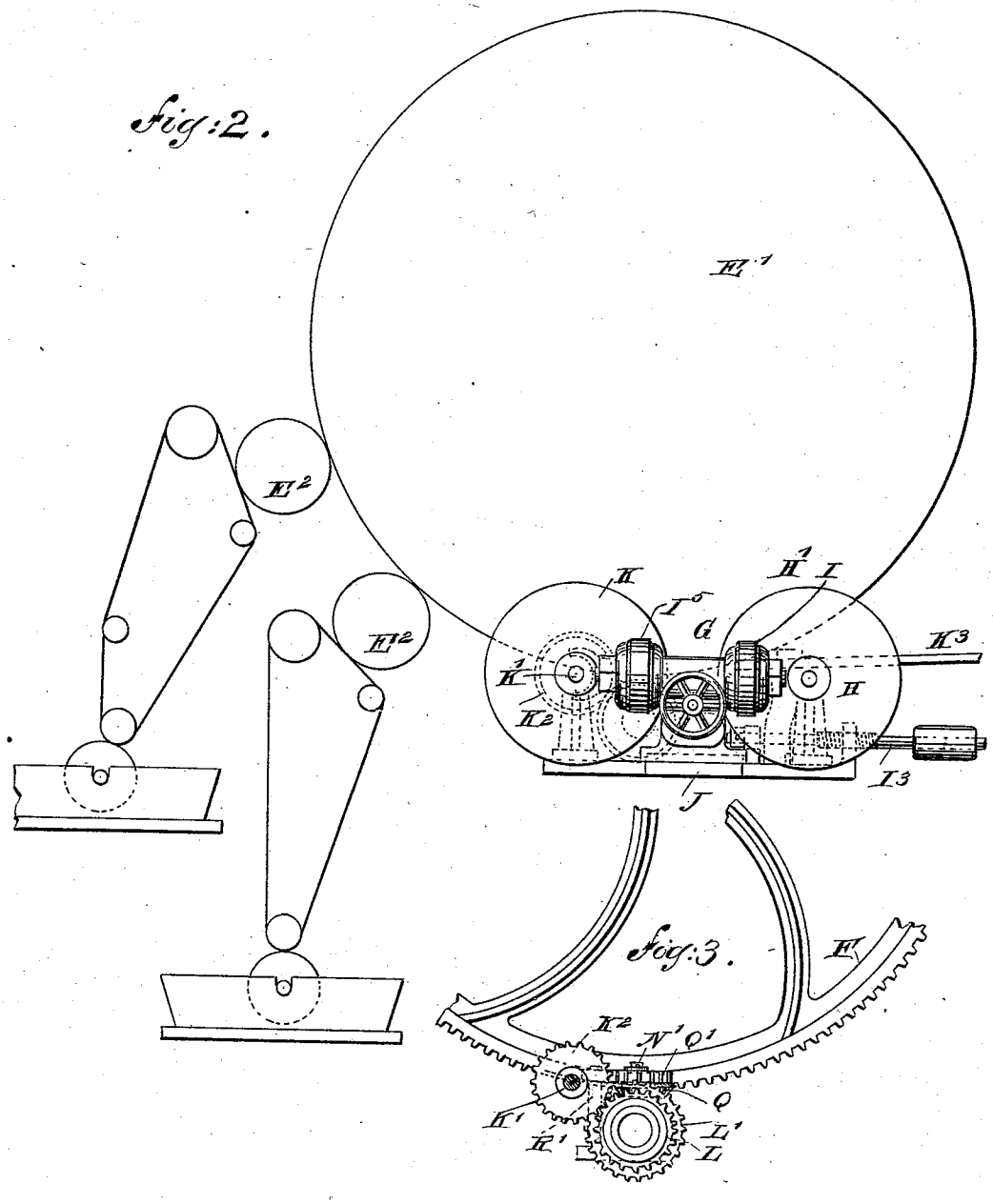


Fig: 3.

WITNESSES:

Chas. Nida.

Thos. J. Hoskins

INVENTOR

W. H. Waldron

BY Munn & Co

ATTORNEYS.

(No Model.) 3 Sheets—Sheet 3.

W. H. WALDRON.

WALL PAPER PRINTING MACHINE.

No. 531,075. Patented Dec. 18, 1894.

Fig: 4.

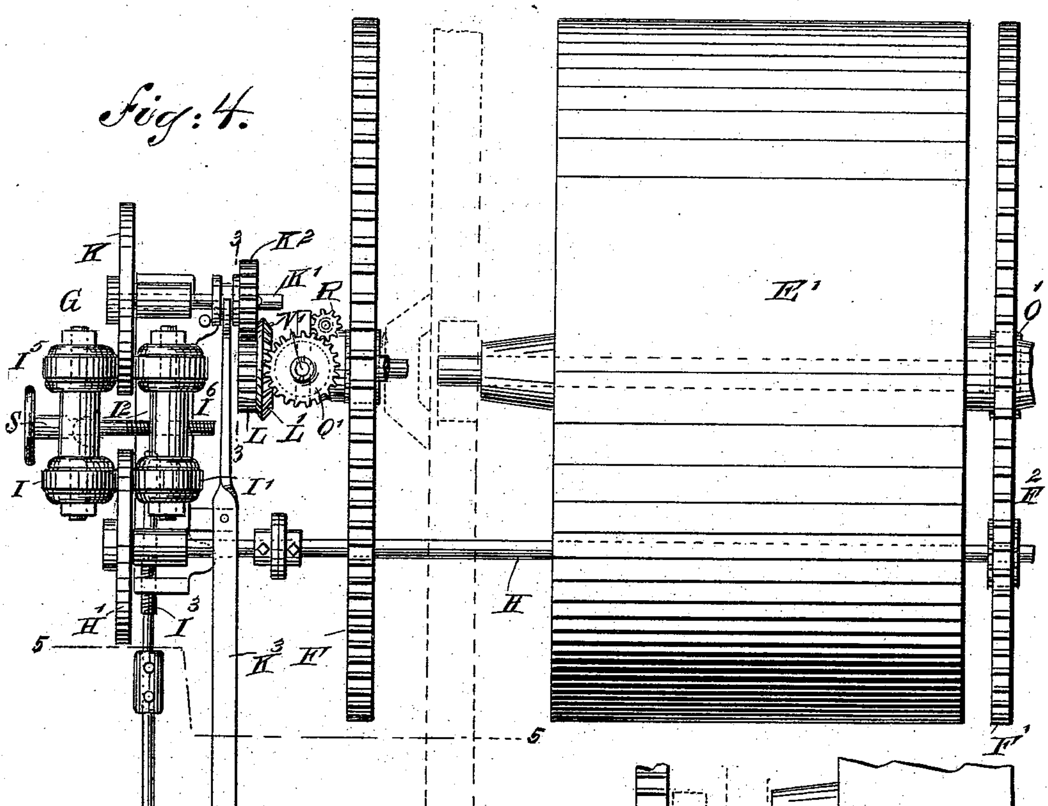
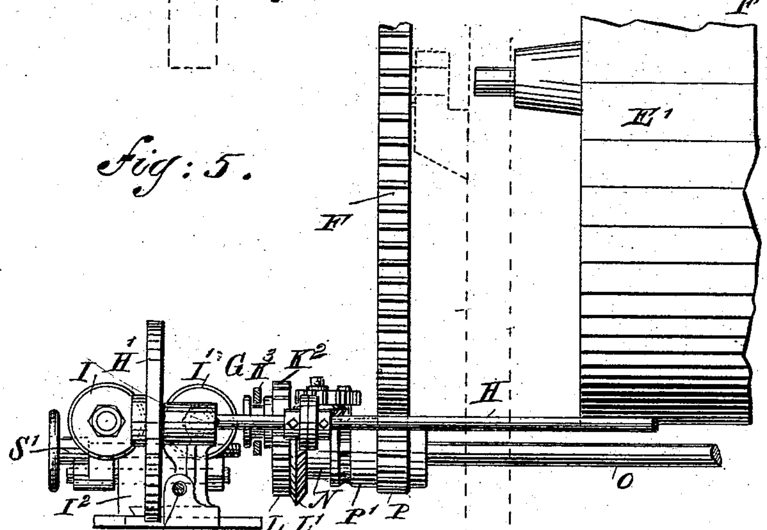


Fig: 5.



WITNESSES:

Chas Nida.

Theo. G. Hostler

INVENTOR

W. H. Waldron

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLIAM H. WALDRON, OF NEW BRUNSWICK, NEW JERSEY.

WALL-PAPER-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 531,075, dated December 18, 1894.

Application filed May 8, 1894. Serial No. 510,462. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. WALDRON, of New Brunswick, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Wall-Paper-Printing Machines, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved wall paper printing machine, which is comparatively simple and durable in construction, and more especially designed for producing a wall paper having two impressions from two machines, said machines having an intermediate drying apparatus, the design for the paper of the second machine registering accurately with the design already printed on the paper by the first machine, irrespective of the shrinkage or expansion of the paper caused by the said intermediate drying apparatus.

The invention consists principally of a compensating device for the printing rollers of the second machine, to run the said printing rollers at a speed corresponding to the design of the paper passing over the cylinder, independent of the speed of the latter.

The invention also consists of certain parts and details, and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a diagrammatic side elevation of the machine. Fig. 2 is an enlarged side elevation of the compensating mechanism for the second machine. Fig. 3 is a sectional side elevation of part of the same on the line 3—3 of Fig. 4. Fig. 4 is a plan view of the compensating mechanism as applied. Fig. 5 is a cross section of the same on the line 5—5 of Fig. 4. Fig. 6 is an enlarged sectional side elevation of part of the compensating mechanism on the line 6—6 of Fig. 7; and Fig. 7 is a transverse section of the same.

The wall paper printing machine to be described in detail is designed more especially for printing a design in ordinary colors on the paper by one machine, and then adding additional colors, gold, bronze or similar material to the design already printed, by a second machine. Now in order to do this it is necessary that the paper should be subject to a drying process between the two impressions, to permit of sufficiently drying the first color before the second color is applied, so as not to blur the original design. In order to carry this into effect I employ first a wall paper printing machine A of the usual construction, having a cylinder, and a series of printing rollers, each fed from a suitable fountain in the usual manner, the paper B passing from an endless roll C upon the cylinder and between the printing rollers, to successively receive a ground and the several colors individually applied to form the first design. The paper passes from the cylinder of this wall paper printing machine A to a drying apparatus D of any approved construction preferably consisting of movable belts heated by steam, as indicated in Fig. 1. The paper, after it has been dried so as to prevent blurring of the design already printed, is passed to a second wall paper printing machine E, to receive the last impression before passing to a second drying apparatus D′, and to the lath supporting device D^2 for hanging the paper up for the final drying.

It will be seen that the paper between the first and second wall paper printing machines will undergo considerable change, so that the printing rollers E^2 of the second wall paper printing machine E will not, at all times, register with the design printed on the paper by the first wall paper printing machine A. In order to compensate for this irregularity caused by the expansion or contraction of the paper while passing from the first machine to the second machine, it is necessary to provide a compensating device which regulates the speed of the printing rollers E^2 according to the design on the traveling paper and independent of the speed of the cylinder E′ of the said second wall paper printing machine.

The printing rollers E^2 are driven from the large gear wheel F, arranged next to the cylinder E′, but mounted on a stud in alignment with the shaft of the cylinder E′. This gear wheel has the same speed as the cylinder E′ as long as the design on the paper registers with the designs on the printing rollers E^2; but in order to drive the said printing rollers E^2 at a higher or lower rate of speed so as to

match the design on the paper whenever the rollers E^2 are out of register with the design on the paper already printed, a compensating device G is employed to accomplish this purpose. This compensating device G is provided with a driven shaft H connected by a pinion F^2 with the large gear wheel F', secured on the shaft of the cylinder E'.

On one end of the shaft H is secured a friction disk H', engaged on its faces by oppositely arranged friction wheels I and I', journaled in a frame I^2 fitted to slide longitudinally on a bracket J, forming part of the main frame for the machine E. The frame I^2 is adapted to be shifted longitudinally by the operator, and for this purpose a screw rod I^3 screws in the said bracket J, and engages the frame I^2 so as to move the latter longitudinally whenever the operator turns the hand wheel I^4 on the said screw rod I^3.

On the shafts of the friction wheels I and I' is held a second set of friction wheels I^5 and I^6, engaging the faces of a friction disk K, secured on a shaft K' journaled in suitable bearings in the bracket J. On this shaft K' is mounted to turn with and to slide on it, a gear wheel K^2, engaged by a shifting lever K^3 under the control of the operator, to move the gear wheel K^2 on the shaft K', for the purpose hereinafter more fully described. The gear wheel K^2 is in mesh with a gear wheel L, mounted to rotate loosely on a sleeve N, secured on the main driving shaft O extending transversely and provided with a pinion O' in mesh with the gear wheel F', for driving the latter and the cylinder E', the said shaft O carrying a pulley for connection with suitable machinery to impart a rotary motion to the said shaft.

On the gear wheel L is formed or secured a bevel gear wheel L', in mesh with a bevel gear wheel Q mounted to rotate on a stud N' forming part of the sleeve N. On the top of this bevel gear wheel Q is formed or secured a spur wheel Q', in mesh with a pinion R secured on a shaft R', journaled in suitable bearings formed on the sleeve N, as is plainly illustrated in Fig. 6. On this shaft R' is secured a worm R^2 in mesh with a worm wheel P', formed on the hub of the gear wheel P, mounted to rotate loosely on the sleeve N, and in mesh with the gear wheel F. Now, when the shaft O rotates, the latter gives a revolving motion to the gear wheel F' and cylinder E', and also to the sleeve N, so that the shaft R' journaled in the sleeve is carried around and by the worm R^2 locked in the worm wheel P', rotates the latter on the sleeve N, and consequently rotates the gear wheel P in mesh with the gear wheel F, to rotate the latter and the printing rollers. Now, when the machine is in operation, and the paper B already printed on and dried passes to the wall paper printing machine E, and the operator in charge of this machine finds that the design already printed on the paper does not register with the design on the printing rollers E^2, then he shifts the frame I^2 by turning the hand wheel I^4, so as to move the friction wheels I, I', and I^5, I^6, on the faces of the disks H' and K, to vary the speed of the disk K. This variation of speed, assuming the gear wheels K^2 and L to be in mesh with one another, causes a faster or slower rotation of the gear wheels K^2, L, L', Q, Q' and R, whereby the shaft R', worm R^2 and worm wheel P' and gear wheel P, are caused to rotate slower or faster, thus causing the gear wheel F to rotate slower or faster on account of being in mesh with the gear wheel P.

It is understood that when the operator, for instance, turns the hand wheel I^4 so as to shift the frame I^2 to the right, then the disk H' is engaged nearer its center by the set of friction wheels I, I', and the other friction wheels I^5, I^6, move farther out from the center of their disk K. By this movement a slower rotary motion is given to the sets of gear wheels I, I', I^5, I^6, and a slower motion to the disk K and the gearing connected therewith at its shaft K', so that the gear wheel F rotates slower to turn the impression rollers at a rate of speed to cause their designs to register with the designs already printed on the wall paper before it reaches the printing machine E.

By turning the hand wheel I^4 in the opposite direction, a reverse movement of the several parts takes place; that is, the gear wheel F and the printing rollers E^2 are rotated faster, to properly register with the design.

As a rule, the pattern when coming to the second machine E, is elongated to an extent which depends upon the quality of the paper, the degree of heat applied, &c., and consequently the printing rollers E^2 have to run slower than the normal rate, to permit a corresponding longer pattern to register with the pattern already on the paper. Now, when working under similar conditions, *i. e.*, with the same quality of paper, &c., the elongation of the pattern will be a constant one, and thus it is frequently only necessary for the operator to manipulate the lever K^3 to throw the gear wheel K^2 into or out of mesh with the gear wheel L, it being understood that the friction wheels I I' I^5 I^6 are beforehand adjusted to so modify the speed of the printing rollers as to compensate for the said elongation of the pattern. When the wheel K^2 is out of mesh with the wheel L, then the rotary motion of the shaft O is transmitted by its fixed sleeve N, carrying around the pin N', gear wheel Q', pinion R, shaft R' and the worm R^2 locked with worm wheel P' to gear wheel P, and to the wheel F driving the printing rollers. Now, when this gear wheel K^2 is in mesh with the gear wheel L, it drives the latter according to its speed faster or slower than the shaft O, and this differential motion is transmitted by the wheels L', Q, Q', R, shaft R', worm wheel R^2, worm wheel P', to wheel P faster or slower than the shaft O, and consequently a faster or slower motion is given to the wheel F and printing rollers E^2. Thus

it will be seen that the operator in charge of the wall paper printing machine E can, at all times, regulate the speed of the printing rollers E^2 in such a manner as to cause a proper impression to be made on the already printed paper, and irrespective of the speed of the cylinder E'.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A wall paper printing machine, comprising two printing machines, a drying apparatus intermediate of the said machines, and a compensating device for the printing rollers of the second printing machine, to run the said printing rollers at a speed corresponding to the design of the paper printed by the first printing machine, substantially as shown and described.

2. A wall paper printing machine, provided with two printing machines each comprising a cylinder and printing rollers, and a compensating device for the printing rollers of the second machine, to run the said printing rollers at a speed corresponding to the design of the paper passing over the cylinders, independent of the speed of the latter, substantially as shown and described.

3. In a wall paper printing machine of the class described, the combination with the cylinder, of printing rollers for the said cylinder, gear wheels for driving the said printing rollers, and a compensating mechanism for regulating the speed of the said gear wheels according to the design already printed on the paper before reaching the cylinder, substantially as shown and described.

4. A wall paper printing machine of the class described, provided with a cylinder, impression rollers, and a compensating device for the impression rollers, comprising a drive shaft adapted to rotate at a predetermined rate of speed relatively to the cylinder, a friction disk held on the said driving shaft, two sets of friction wheels, of which one engages the said friction disk, a second friction disk engaged by the second set of friction wheels, a gearing for the shaft of the said second friction disk, and a transmitting device driven from the said gearing and having an operative connection with the printing rollers to modify the speed of the latter, substantially as shown and described.

5. A printing machine provided with an impression cylinder and printing rollers, and a driving mechanism for the said printing rollers, and provided with a speed modifying device operatively connected with the said printing rollers for varying the rate of speed of the printing rollers relative to the speed of the said impression cylinder, substantially as shown and described.

WILLIAM H. WALDRON.

Witnesses:
W. E. VAN DEVENTER,
H. V. D. WALDRON.