(No Model.) 3 Sheets—Sheet 1.

C. S. CLARK.

Apparatus for Drying Wall Paper.

No. 239,603. **Patented April 5, 1881.**

Fig. 1.

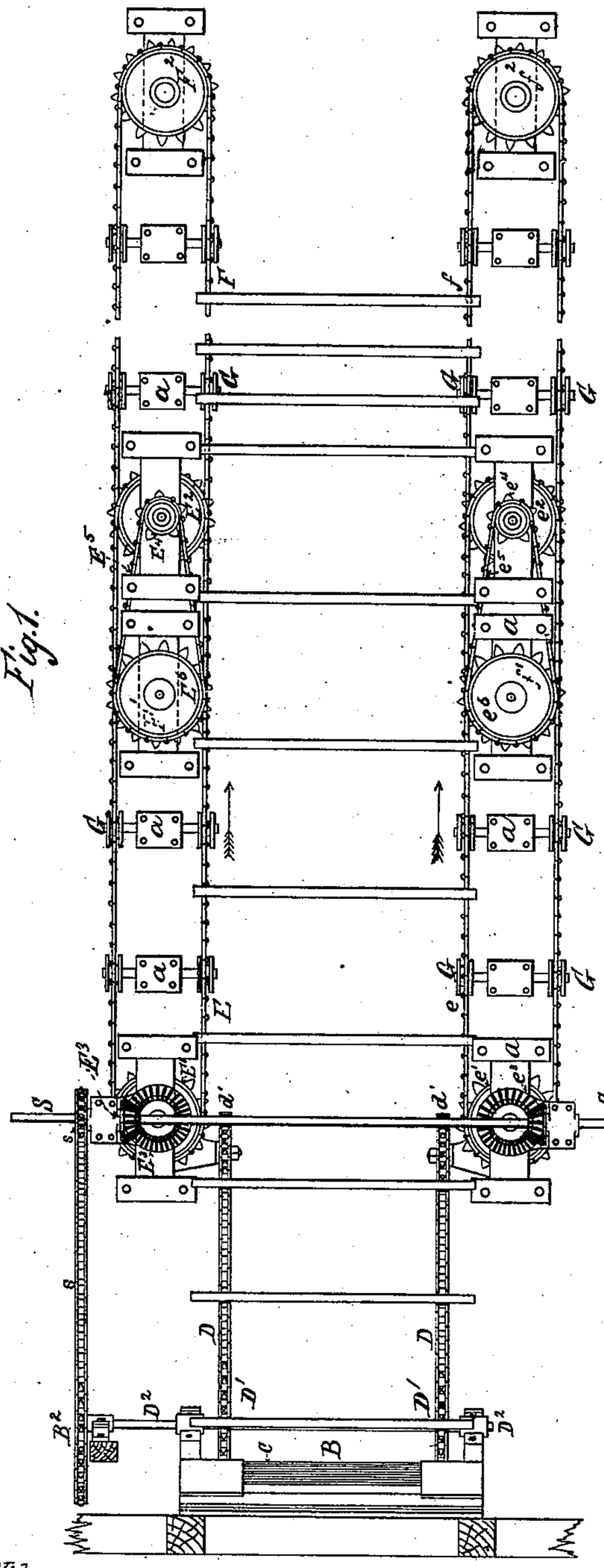


Fig. 2.

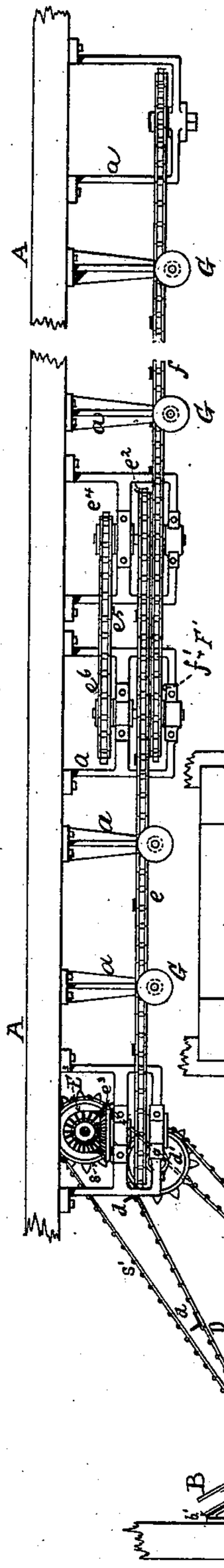
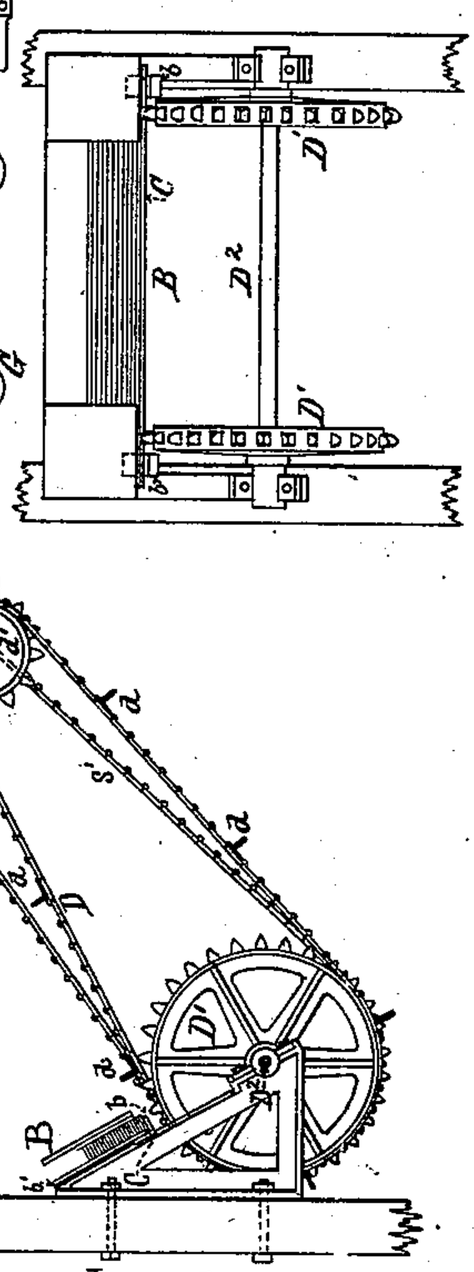


Fig. 3.



Witnesses:-

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(No Model.)

3 Sheets—Sheet 2.

C. S. CLARK.

Apparatus for Drying Wall Paper.

No. 239,603. **Patented April 5, 1881.**

Fig. 4.

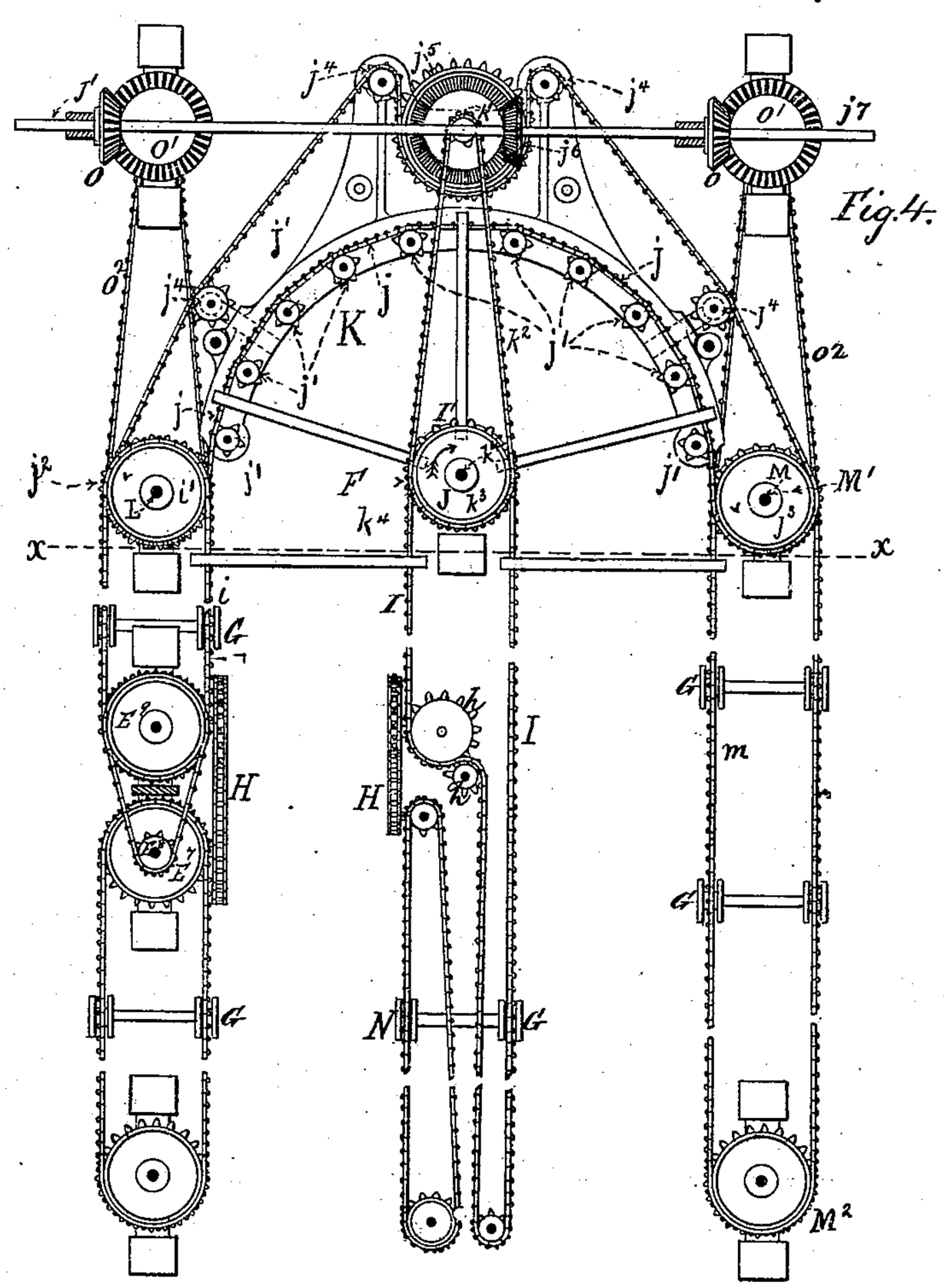


Fig. 5

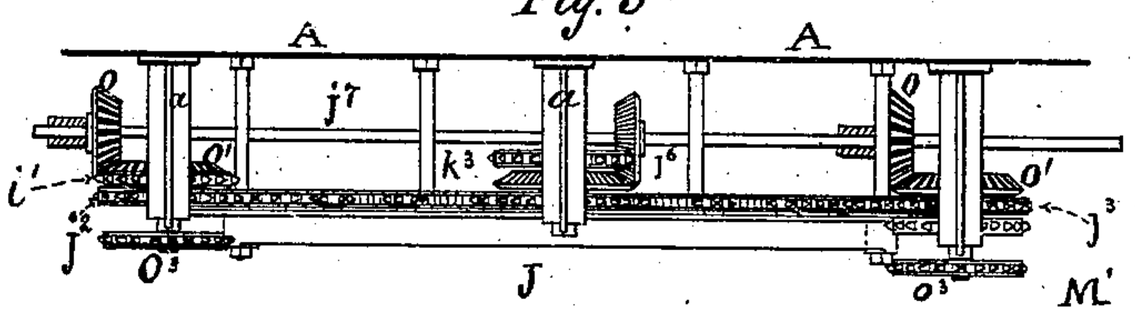
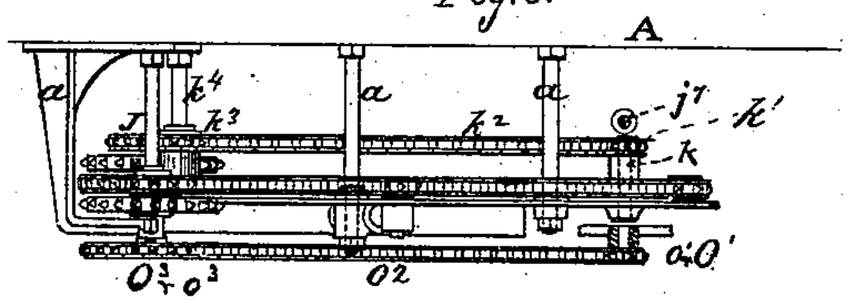


Fig. 6.



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(No Model.) 3 Sheets—Sheet 3.

C. S. CLARK.

Apparatus for Drying Wall Paper.

No. 239,603. Patented April 5, 1881.

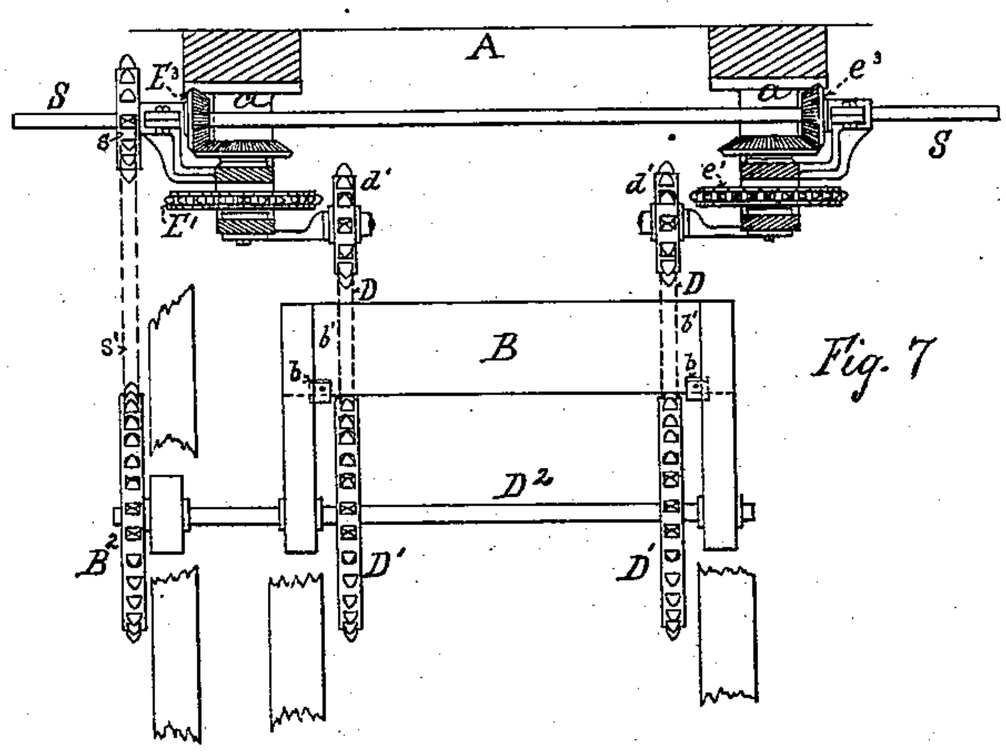

Fig. 7

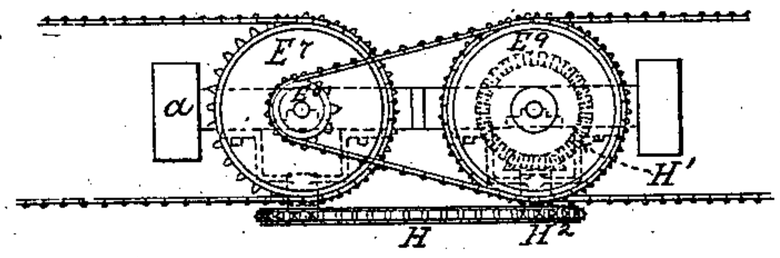

Fig 8

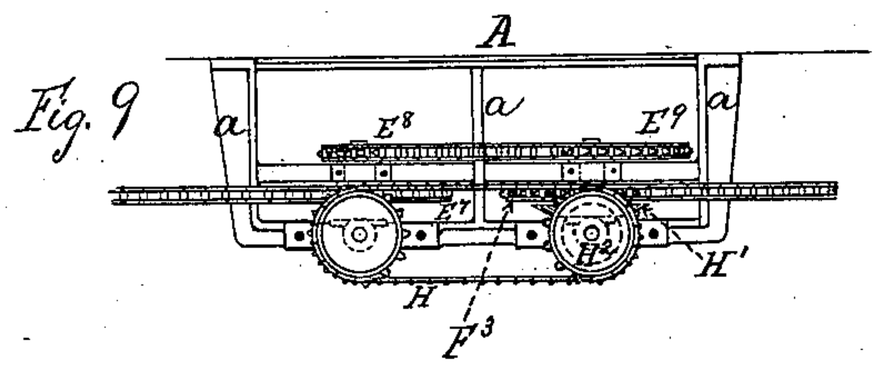

Fig. 9

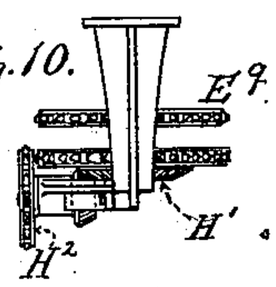

Fig. 10.

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UNITED STATES PATENT OFFICE.

CULVER S. CLARK, OF NEW YORK, N. Y.

APPARATUS FOR DRYING WALL-PAPER.

SPECIFICATION forming part of Letters Patent No. 239,603, dated April 5, 1881.

Application filed December 22, 1880. (No model.)

To all whom it may concern:

Be it known that I, CULVER S. CLARK, of the city and State of New York, have invented certain Improvements in Apparatus for Drying Wall-Papers, of which the following is a specification.

My improvements relate to the apparatus employed for receiving wall-paper from the rolls on which it is printed, and moving it in pendent folds or festoons through the drying-room. In this class of apparatus the folds of paper are suspended upon horizontal bars or so-called "laths," the ends of which rest, respectively, upon two parallel endless belts, which move in like direction, and carry the laths and pendent folds of paper across the drying-room, and usually deliver them to a so-called "turn-around," by which they are delivered to another pair of belts.

As heretofore constructed, the turn-around consists of a rotating horizontal disk, upon the end of which one end of each lath is deposited, while the other end of the lath is, at the same time, deposited upon an endless belt or rope carried around a series of sheaves placed concentrically with relation to the rotating disk. The laths, bearing the pendent folds of paper, which have been transported to one end of the drying-room by the first pair of carrier-belts, are delivered by the turn-around to a second pair of carrier-belts, by which the laths and paper are returned to the end of the drying-room from which they started, or are carried to some other part of the drying-room. There has heretofore been some uncertainty in the delivery of the laths and in their movements in making the turn at the end of the drying-room, and the services of an operator have been required to adjust them, by hand, upon the curved belt, so that their proper radial position should be preserved. It has not unfrequently happened that the laths, in passing around the turn, would become dislodged from the curved belt, and would fall, thereby causing the loss of the paper hanging upon them, which, in the act of falling before it had been thoroughly dried, would be blurred and otherwise injured.

The general characteristic of my improvements is the making of the entire carrying apparatus positive in its mode of operation, and thus adapting it to work automatically in performing functions which have heretofore required the intervention of an operator.

My invention consists, first, in the employment of carrier-chains driven by linked systems of sprocket-wheels rotating on vertical axes, whereby the laths are afforded support upon the edges of the chains, and the chains and sprocket-wheels serve to transmit to all parts of the apparatus motion derived from a single prime mover.

The second feature of my invention consists in the substitution, in place of the rotating disk ordinarily employed in the turn-around, of a sprocket-wheel rotating upon a vertical axis and engaging the bight of a chain, one straight part of which constitutes one track of the straight path along which the laths are conducted away from the printing-rolls, while the other straight part of the said chain constitutes one track of another straight path, along which the laths are conducted in a different direction. I am thus enabled to change the direction of movement of the laths without dislodging them from one of the two chains which conduct them to the turn-around.

A further feature of my invention consists in gearing all the carrying-chains together, preferably by means of driving-chains and sprocket-wheels of suitable relative diameter, so that the motions of the carrier-chains shall be positive.

It will thus be seen that by my invention the entire system of carrying apparatus, including that portion of it which carries the laths in straight paths, as well as the turn-around, is so geared together as to be capable of being driven from a single prime mover. The opposed straight lines of parallel chains are moved at precisely the same speed, while the speed of the inner and outer chains of the turn-around is varied in the exact ratio of their relative distance from the axis of the wheel which drives the inner chain of the turn-around. The chains preferably employed for this purpose are made of flat links hinged together, and having but one plane of flexure, all parts of which are parallel with the parallel axes of oscillation of the chain-links. It hence follows that the straight lengths of carrier-chains are not sagged downward in any material degree

by the weight of the laths and paper which they support.

The accompanying drawings, representing apparatus embodying my improvements, are as follows:

Figure 1 is a top view of the apparatus for presenting the carrier-bars or laths, singly, in position to receive the folds of paper from the printing-rolls, and of systems of carrier-chains for conducting the laths in a straight path across the drying-room. Fig. 2 is a side elevation of the same, Figs. 1 and 2 showing the sprocket and chain gearing by means of which the rapidity of the motion of the laths is diminished during their journey along the latter portion of their path. Fig. 3 is a front elevation of the lath-magazine. Fig. 4 is a top view of parallel systems of horizontal carrier-chains, connected by a so-called "turn-around," by means of which the direction of the movements of the laths is changed. Fig. 5 is a tranverse vertical section through the line *x x* on Fig. 4. Fig. 6 is a side elevation of the turn-around. Fig. 7 is a rear elevation of the magazine, showing the gearing which drives the carrier-chains. Fig. 8 is a top view of the adjacent parts of the quicker and slower moving carrier-chains, and a transfer-chain for conducting the laths from the quicker-moving carrier-chain to the slower-moving carrier-chain. Fig. 9 is a side elevation of the transfer-chain and the adjacent portions of the quicker and slower moving carrier-chains. Fig. 10 is an end elevation of the transfer-chain, showing the bevel-gearing for transmitting motion from the slower-moving carrier-chain to the transfer-chain.

I prefer the method of carrying out my improvements shown in the drawings, in which, as will be seen, the systems of wheels which drive or guide the carrier-chains are represented as suspended from the ceiling A, of the drying-room, by means of suitable hangers *a*. The drying-room may be of such length that the paper will be sufficiently dried by being conducted once across it from one end to the other, in which case, of course, no turn-around will be required.

Figs. 1 and 2 exhibit the application of my improvements to carrying apparatus for use in a long drying-room, and illustrate that feature of my invention which consists in diminishing the speed of motion of the laths or carrier-bars after they have performed the first part of their journey.

A supply of laths is stored in a lath-magazine, B, wherein they lie horizontally one upon another. The magazine is open at the top to permit the introduction of the laths, and open at the bottom to permit the lowermost lath to drop and rest upon two stops, *b*. Each of the stops *b* is a small bar of iron bent to a right angle, having one of its legs bolted to the rear wall, *b'*, of the magazine, while the other leg projects forward under the mouth of the magazine at a distance therefrom slightly greater than the thickness of a lath.

Two elevator-chains, D D, provided at suitable intervals with the outwardly-projecting wings *d*, are engaged by the large sprocket-wheels D' D', affixed to the magazine-shaft D^2. The chains D D also engage the sprocket-wheels *d'*, which are mounted in horizontal bearings, and placed respectively just within the two carrier-chains E and *e*, which respectively constitute the opposite side tracks of the straight path along which the laths are carried across the drying-room. By the movement of the elevator-chains D D the wings *d* are successively brought against the lowermost lath, C, which rests upon the stops *b* below the mouth of the magazine, and push the lath C out from under the pile of laths resting upon it and carry it up and over the small sprocket-wheels *d'*, and deposit one end upon the carrier-chain E and the other end upon the parallel carrier-chain *e*.

The carrier-chains E and *e* are stretched in relatively parallel positions in the same horizontal plane by means of sprocket-wheels mounted in vertical bearings. Thus the bight of the chain E next the magazine is stretched around the sprocket-wheel E', while the opposite bight of the chain E is stretched around the sprocket-wheel E^2. Similarly, the bight of the chain *e* next the magazine is stretched around the sprocket-wheel *e'*, while the opposite bight of the chain is stretched around the sprocket-wheel e^2. The sprocket-wheels E' and *e'* are made to rotate in opposite directions by power transmitted by means of the miter or bevel gearing E^3 e^3 from the horizontal driving-shaft S. The shaft S may also be provided with a sprocket-wheel, *s*, to engage a chain, *s'*, for imparting rotation to the sprocket-wheel B^2, affixed to the magazine-shaft, and thereby driving the elevator-chains D D. The carrier-chains E and *e* move in the direction indicated by the arrows on Fig. 1, and carry the laths and folds of paper pendent therefrom along the first stage of their journey at such a rate of speed as may be found advisable. Having completed the first stage of their journey, as the paper has become partially dry, the distance between the laths and festoons of paper may be safely diminished, and the carrier-chains E and *e* therefore deliver the laths successively to the carrier-chains F and *f*, which move in the same direction as the carrier-chains E and *e*, respectively, but at a lower rate of speed.

The delivery of the laths from the quicker-moving carrier-chains to the slower-moving carrier-chains may be effected by stretching the slower-moving chains in a horizontal plane immediately beneath the plane occupied by the quicker-moving chains, as shown in Figs. 1 and 2, in which case the shaft of the sprocket-wheel E^2 is provided with a small sprocket-wheel, E^4, engaging the chain E^5, which drives the larger sprocket-wheel E^6 affixed to the shaft of the sprocket-wheel F'. Similarly the shaft of the sprocket-wheel e^2 is provided with a sprocket-wheel, e^4, engaging the chain e^5, which drives the larger sprocket-wheel e^6, affixed to the

shaft of the sprocket-wheel f'. The sprocket-wheels $F' f'$ engage the nearer bights of the slow-moving carrier-chains F f, the distant bights of which are engaged by the sprocket-wheels $F^2 f^2$, respectively.

The carrier-chains are prevented from sagging between the sprocket-wheels by means of the friction rollers or sheaves G.

The laths drop, by their own gravity, from the quicker-moving chains E e, and lodge upon the slower-moving carrier-chains F f.

If desired, other systems of carrier-chains moving at still lower rates of speed may, in like manner, be combined with the carrier-chains F f, and the speed of movement of the laths across the drying-room may thus be diminished, step by step, several times in the course of their journey.

Instead of arranging the carrier-chains, which move at different speeds, in successively lower planes, as illustrated in Figs. 1 and 2, they may be arranged in the same plane, and the laths may be carried across the gaps between the quicker-moving chains and the slower-moving chains by means of chains stretched in vertical planes on sprocket-wheels rotating on horizontal axes, as shown in Figs. 4, 8, 9, and 10. In this case the shaft of the sprocket-wheel E^7, which corresponds to the sprocket-wheels $E^2 e^2$, is provided with a small sprocket-wheel, E^8, carrying a chain which engages and drives the larger sprocket-wheel E^9, affixed to the shaft of the sprocket-wheel F^3, which corresponds to the sprocket-wheel F', previously described.

The transfer-chain H, which carries the laths across the gap between the quicker-moving and slower-moving carrier-chains, is driven by the miter or bevel gearing H', which transmits motion from the shaft of the horizontal sprocket-wheel F^3 to the vertical sprocket-wheel H^2. Each side track is provided with the transfer-chain H, and the laths as they leave the quicker-moving carrier-chains lodge upon the the transfer-chains H, which deliver them to the slower-moving carrier-chains.

When it is desired to change the direction of movement of the laths in the drying-room, I employ a turn-around, as shown in Fig. 4, which, it will be seen, represents the curved path which unites the two parallel straight paths along which the laths travel in opposite directions, respectively.

Fig. 4 represents a modification of the sprocket-wheels guiding one of the slower-moving carrier-chains, rendered necessary when the turn-around is employed in connection with the carrier-chains moving at successively lower rates of speed. This modification relates chiefly to the carrier-chain I, which corresponds to the slower-moving carrier-chain E, previously described. One bight, I', of the chain I is stretched around the sprocket-wheels J of the turn-around K. The chain I, extending from one side of the sprocket-wheel J, constitutes one of the side tracks along which the laths are conducted to the turn-around, while on the other side of the sprocket-wheel the chain I constitutes one of the side tracks of the path along which the laths are conducted away from the turn-around. It will thus be seen that the laths, in making the turn from one straight path to the other, are at one end continuously supported upon the carrier-chain I, upon which they rest without dislodgment in making the turn. The opposite ends of the laths are carried along the slower-moving carrier-chain i to the sprocket-wheel i', from which they drop and lodge upon the edge of the curved carrier-chain j, a portion of which is held in a position substantially concentric with the sprocket-wheel J by means of the small sprocket-wheels j'. The curved chain j is stretched in a horizontal plane and held against the guide sprocket-wheels j' by the end sprocket-wheels, j^2 and j^3, the smaller sprocket-wheel j^4, and larger sprocket-wheel j^5. The larger sprocket-wheel j^5 drives the curved chain j, and is itself driven by the bevel-gear j^6 from the line-shaft j^7.

The shaft k of the large sprocket-wheel j^4 is provided with a small sprocket-wheel, k', which engages the chain k^2, stretched around the larger sprocket-wheel k^3, affixed to the shaft k^4 of the sprocket-wheel J. The sprocket-wheels k' and k^3 are so proportioned in diameter as to make the speed of the curved carrier-chain j, in the arc of the circle in which it travels, relatively as much greater than the speed of the chain I in passing around the sprocket-wheel J as the distance of the chain j radially from the center of the wheel J is greater than the diameter of the wheel J.

The sprocket-wheel i' is mounted in a plane immediately above the plane occupied by the curved chain j, and the sheaves G, which support the chain i between the sprocket-wheels upon which it is stretched, are correspondingly elevated in order to deliver the chain i in a horizontal plane to the sprocket-wheel i'.

The sprocket-wheels j^2 and j^3 turn loosely on the vertical shafts L and M. The sprocket-wheel i' is keyed to the shaft L, and a sprocket-wheel, M', is keyed to the shaft M.

The slow-moving carrier-chain m is stretched in a horizontal plane parallel to the chain I, between the sprocket-wheels M' and M^2. The carrier-chains I and m are moved at the same rate of speed.

The guide sprocket-wheels h and h' hold the slower-moving chain I clear from the quicker-moving chain N, as shown in Fig. 4. The proper speed is imparted to the quicker-moving carrier-chain N by means of suitably-proportioned bevel-gear driven by the shaft of the sprocket-wheel h, or in any other way.

The outer chains of the straight paths are driven from the line-shaft j^7 by means of the bevel-gears O and o, which impart rotation to the sprocket-wheels O' and o', from which the chains O^2 and o^2 are extended to the sprocket-wheels O^3 and o^3, keyed to the shafts L and M.

It will be seen that in employing the turn-around I adhere to that feature of my invention which consists in moving all parts of the

apparatus positively with relatively appropriate speeds.

I claim as my invention—

1. Apparatus for drying paper consisting of parallel carrier-chains, stretched in horizontal planes by means of sprocket-wheels rotating in vertical bearings with like speed, whereby the carrier-chains present their edges for the support of the laths or carrier-bars upon which the folds of paper are suspended, substantially as described.

2. Two systems of parallel carrier-chains, respectively moving at different rates of speed, stretched in alignment in the same horizontal plane by means of sprocket-wheels rotating in vertical bearings, in combination with transfer-chains stretched on sprocket-wheels rotating in horizontal bearings, for conducting the opposite ends of the laths respectively across the gaps between the quicker-moving and the slower-moving chains on either side of the path along which the laths travel, substantially as described.

3. Parallel systems of carrier-chains, substantially such as described, stretched on sprocket-wheels rotating in vertical bearings, in combination with a turn-around, the inner curved track of which is formed by the bight of one of the said carrier-chains, while the outer curved track of the turn-around is formed by a chain guided so as to travel in the arc of a circle by means of sprocket-wheels concentrically placed with relation to the inner curved track, and driven by a sprocket-wheel rotating in vertical bearings, and suitably geared, or otherwise positively connected, with the shaft of the sprocket-wheel carrying the bight of the chain which forms the inner curved track of the turn-around, whereby the inner and outer curved tracks of the turn-around are moved positively at appropriate rates of speed, substantially as described.

4. Apparatus for conducting laths through a drying-room along straight paths varying in direction, consisting of a chain stretched in a horizontal plane, and carried partially around a sprocket-wheel, whereby the said chain forms one track of two straight paths varying in direction, and a chain stretched in a horizontal plane and so guided as to have one portion of it moved in an arc of a circle joining the two chains which form the opposite side tracks of the said straight paths, respectively.

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Witnesses:
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H. A. HARVEY.