(No Model.)

5 Sheets—Sheet 1.

L. DEJONGE, Jr.

MACHINE FOR DRYING COATED PAPER.

No. 533,444. Patented Feb. 5, 1895.

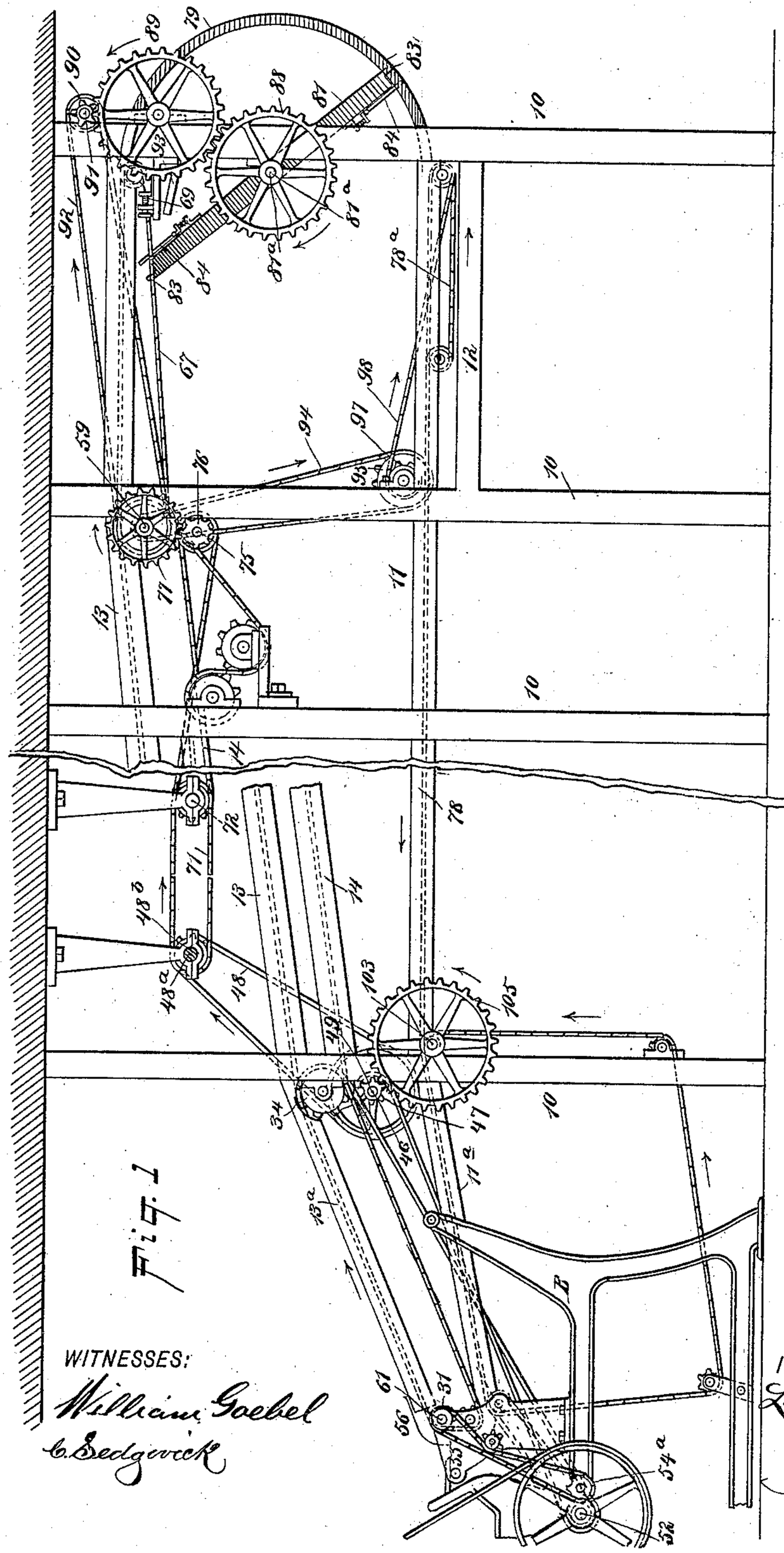

Fig. 1.

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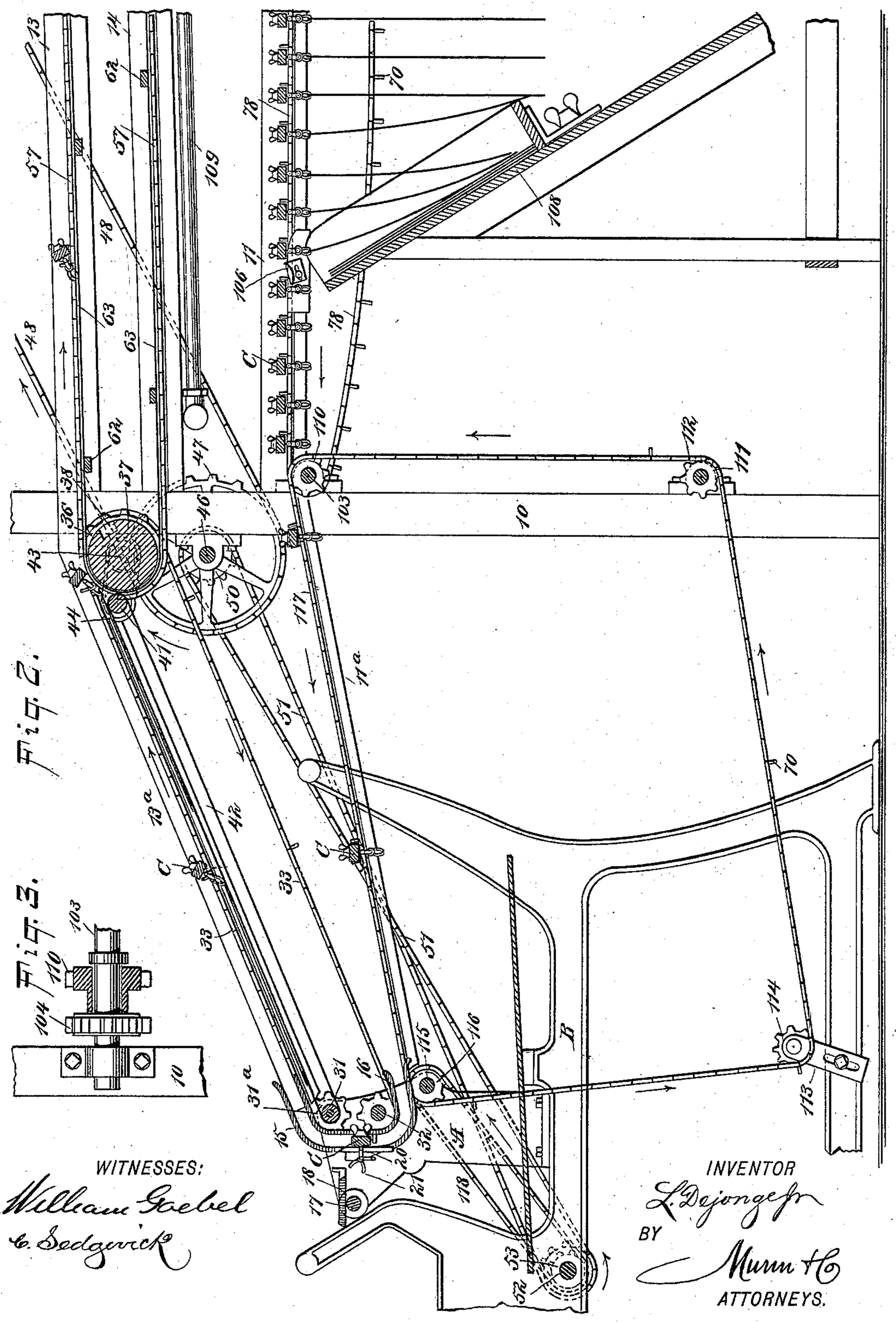

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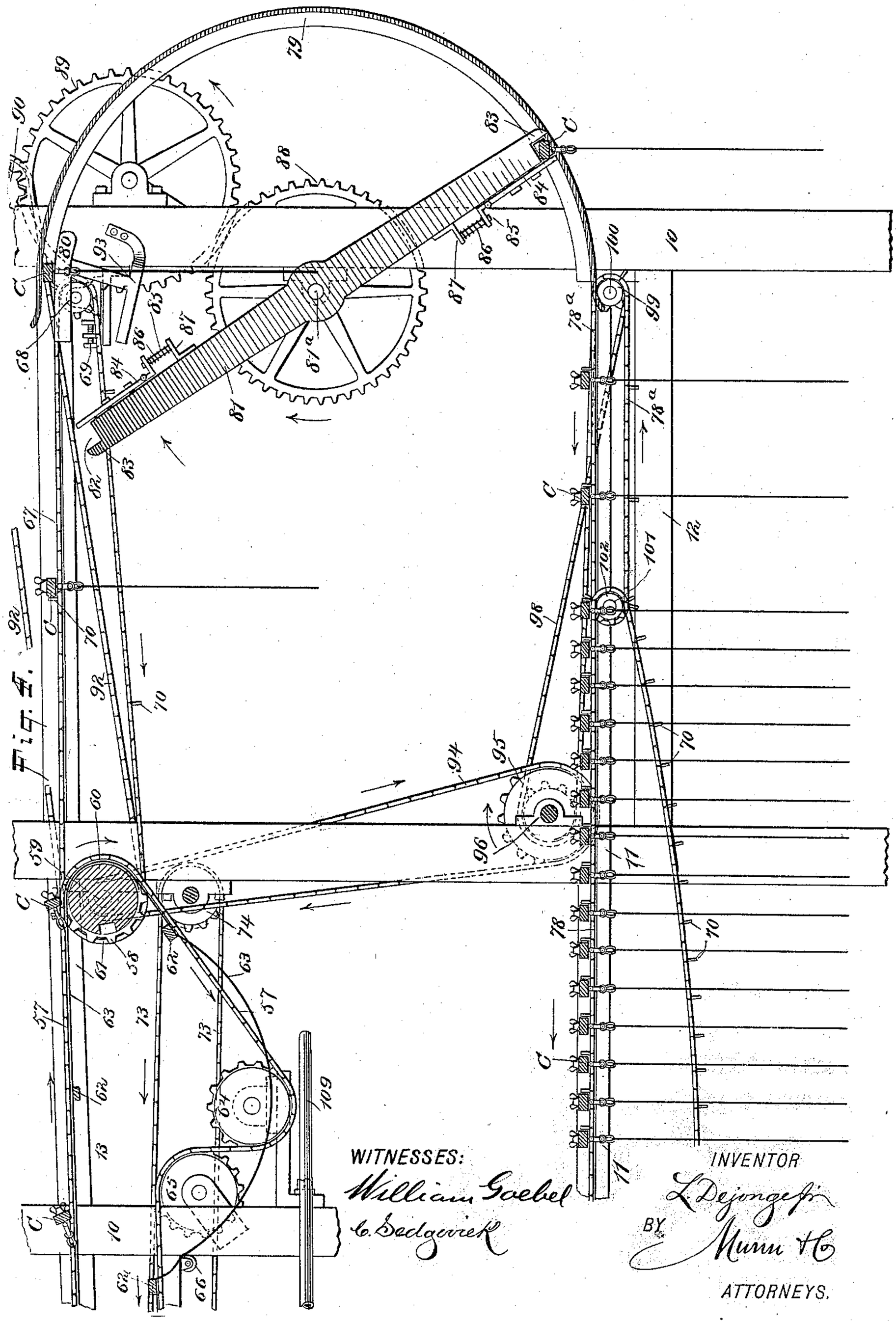

Fig. 4.

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(No Model.)

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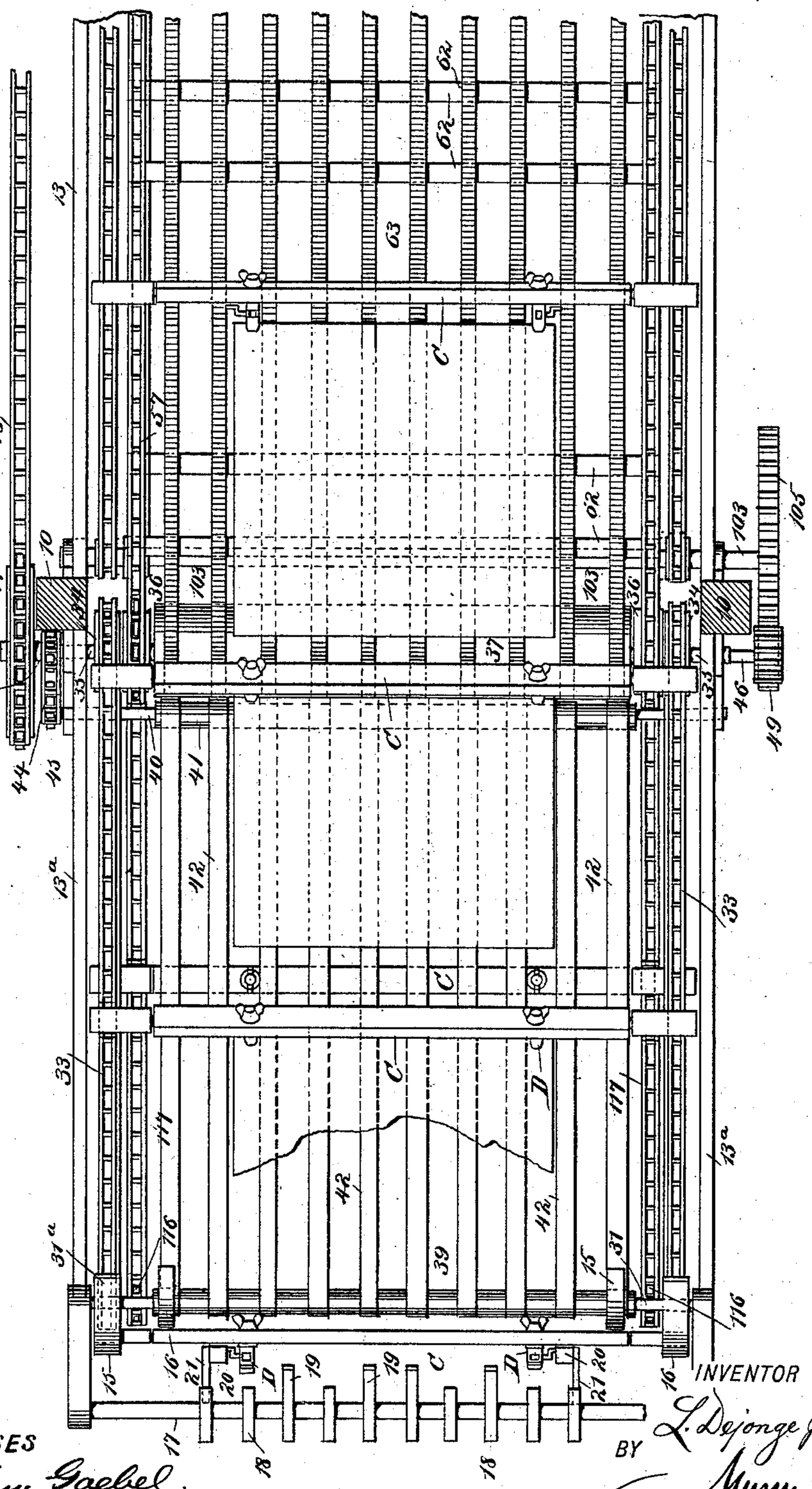
Fig. 5.



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(No Model.) 5 Sheets—Sheet 5.

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MACHINE FOR DRYING COATED PAPER.

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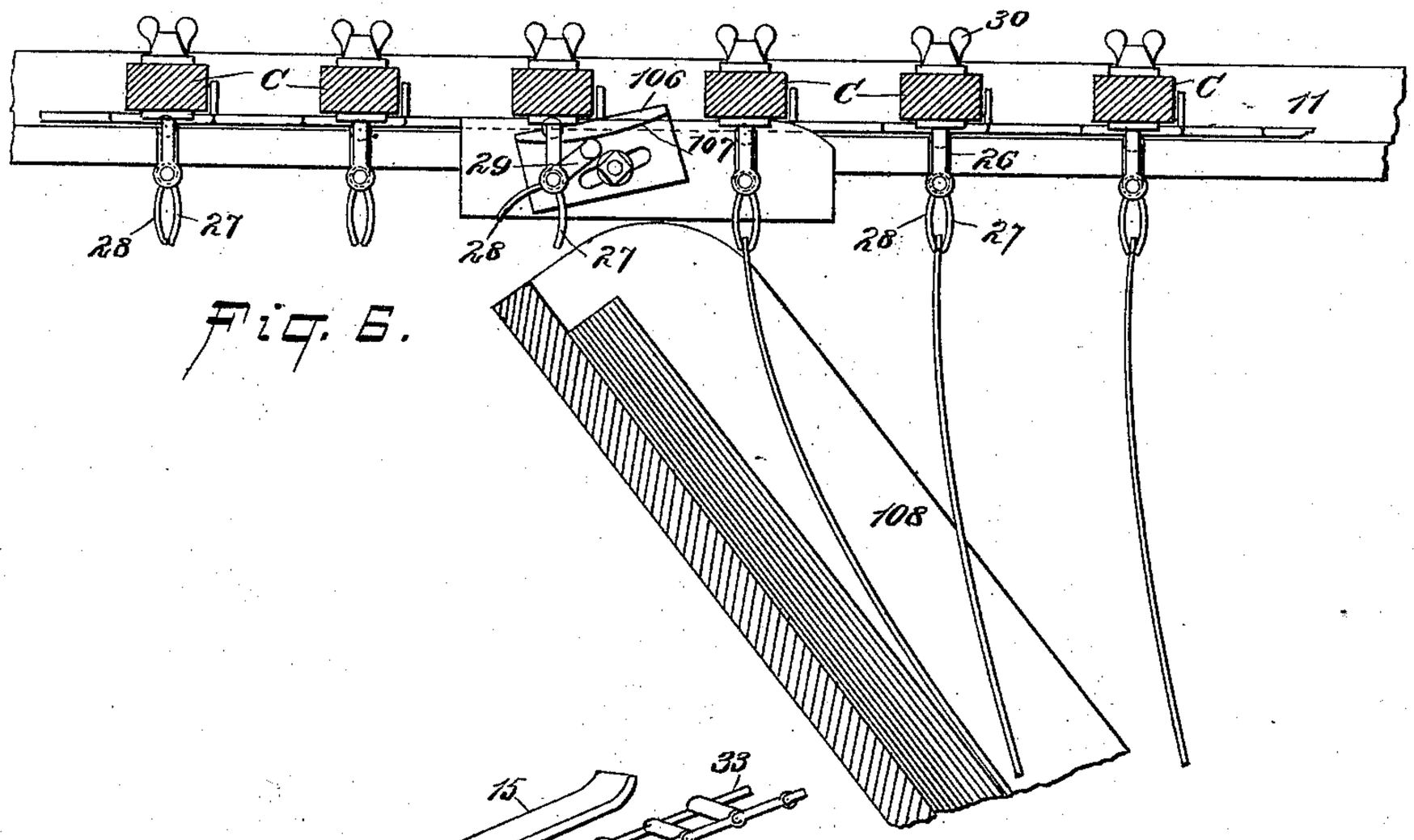

Fig. 6.

Fig. 7.

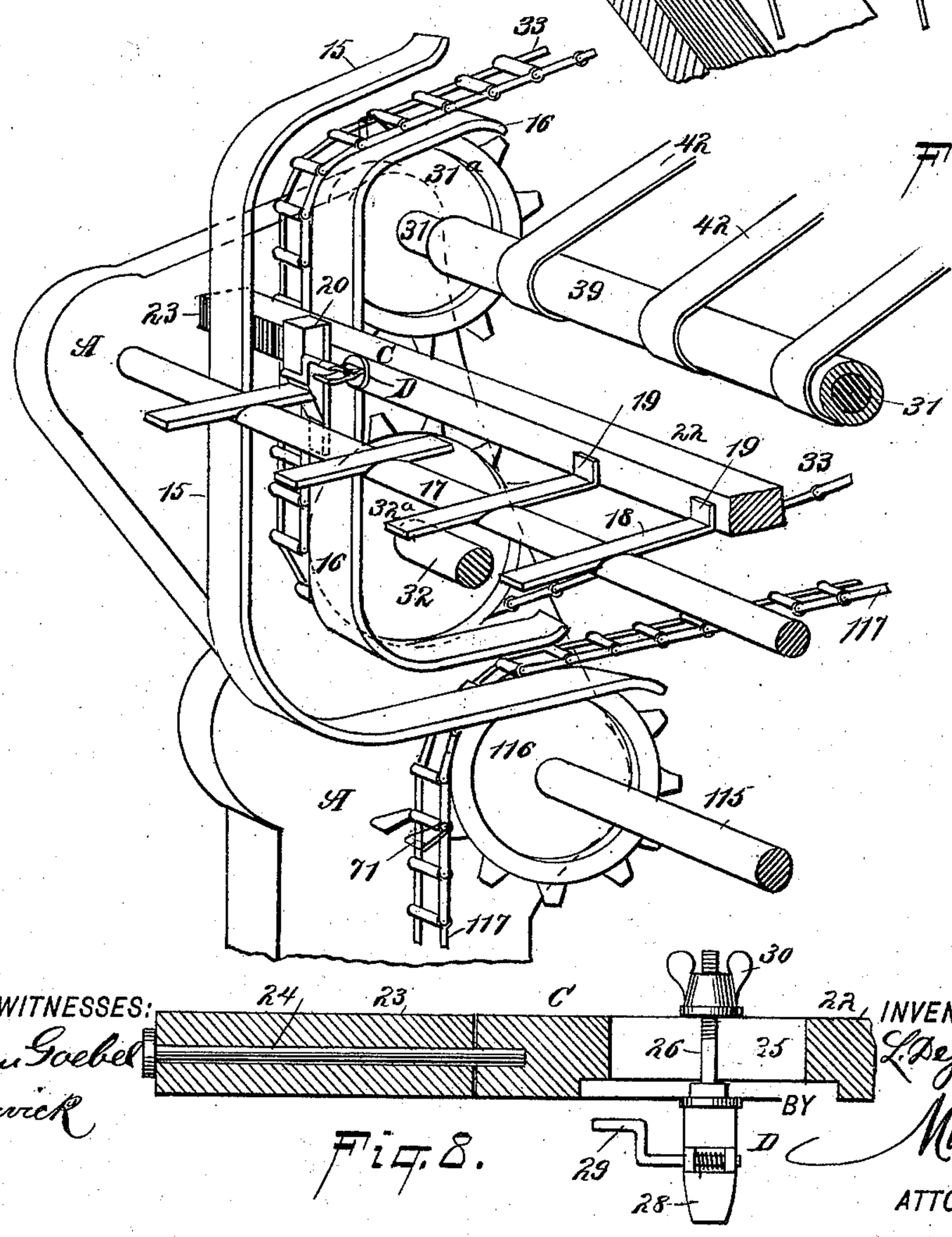

Fig. 8.

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UNITED STATES PATENT OFFICE.

LOUIS DEJONGE, JR., OF STAPLETON, NEW YORK.

MACHINE FOR DRYING COATED PAPER.

SPECIFICATION forming part of Letters Patent No. 533,444, dated February 5, 1895.

Application filed July 25, 1894. Serial No. 518,508. (No model.)

To all whom it may concern:

Be it known that I, LOUIS DEJONGE, Jr., of Stapleton, in the county of Richmond and State of New York, have invented a new and Improved Machine for Drying Coated Paper, of which the following is a full, clear, and exact description.

My invention relates to a machine especially adapted for drying coated paper, or coated articles of any description that may be in sheet form.

One of the objects of this invention is to improve upon the drying section of the machine for coloring and coating paper, for which application for patent was made by me January 31, 1894, Serial No. 498,578, the especial improvement consisting in the employment of tapes, or their equivalents, for maintaining the coated paper, when received by the drier and during a certain time in the drier, in substantially a horizontal position, whereby thin paper, when heavily coated, will not buckle or turn at the corners to any appreciable extent, thus enabling a sheet at a certain point in the run of the drier to hang perpendicularly.

Another improvement consists in the manner in which the sheets are carried from their receiving point in the machine to the discharging point, and likewise in the manner of carrying the sheets, without in the slightest manner disturbing them, from for example an upper to a lower run.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

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

Figure 1 is a front view of the machine, the body being shown broken away in a vertical direction, the central portion being omitted. Fig. 2 is a vertical longitudinal section through the forward portion of the machine. Fig. 3 is a detail view of the gearing on one of the shafts of the forward lower run. Fig. 4 is a vertical longitudinal section through the rear portion of the machine, being virtually a continuation of Fig. 2. Fig. 5. is a plan view of that portion of the machine shown in Fig. 2. Fig. 6 is a detail sectional view of a portion of the lower forward run, illustrating the manner in which the sheets are discharged from their clips, holders or carriers. Fig. 7 is a detail perspective view of a portion of the receiving end of the machine, and Fig. 8 is a detail sectional view of a portion of one of the carriers for the sheets.

In carrying out the invention the main portion of the drier usually consists of front and rear uprights 10, which may, and preferably do, extend from the floor of the building to the ceiling or roof thereof. The uprights may be employed in any desired number, and it may here be remarked that the drier need not be longer than sixty feet. The uprights 10 are connected by guides 11 at each side, located at or near their centers, the guides extending from one end of the machine to the other, and they are preferably angular in cross section, their horizontal members facing inward. The guides 11 are adapted as guides for what may be termed the lower run of the drying apparatus.

The standards are further provided, especially at the rear, by an upper guide 13 for the uppermost run, which guide is inclined from a point near one end downward in direction of the opposite or receiving end of the machine; and owing to the length of the framing the inclination for the guide 13 for the upper run is apparently quite gradual. An intermediate guide 14 is located beneath the forward portion of the upper guide 13, being adapted to guide the lower stretch of the upper run of the machine. The lower guide 14 terminates, as shown in Fig. 1. The lower guide 11, is carried beyond the receiving end of the main frame, forming an auxiliary guide 11^a, and the uppermost guide 13, is provided with a like extension 13^a. These extensions, it will be understood, are at both the front and rear sides of the machine.

The extension guides 11^a and 13^a at each side of the machine are secured in any approved manner to standards A of less height than the uprights 10, the said standards being preferably made of metal, and they may be secured to the bed of the coloring machine

B, as shown in the drawings, and are carried downward to the floor and made to rest thereon.

At the extreme receiving end of the machine, at the front and rear sides of said end portion, two guides 15 and 16, are located, each comprising a lower substantially horizontal member, a vertical member, and an upper horizontal member, extending over the lower and corresponding one. These guides are made preferably of metal, and the guides of each set are located a predetermined distance apart, as shown in Fig. 5, the innermost guide being at one side of, yet in advance of, the outermost guide, and the innermost guide of each set is smaller than the outermost one, as shown in Fig. 7.

A fixed or table shaft 17, is secured in the standards A, being adapted to support a series of fingers 18, sundry of the central fingers being longer than the others, and being fitted with upward extensions. The coated paper or other material to be dried, is either laid upon these fingers, forming a receiving table, or is automatically fed thereto, the upward extensions serving as guides for the sheets.

A trip block 20, is likewise supported from the said fixed shaft 17, preferably through the medium of arms 21, as shown in Fig. 5, the said supporting arms having been omitted in Fig. 7 in order not to complicate said view. The various runs heretofore spoken of are adapted to receive carriers C, the said carriers being used to receive and convey the coated sheets through the drier. These carriers may be of any desired shape or construction. The preferred form however, is shown in Fig. 8, comprising a body 22 and end pieces 23, both body and end sections being preferably rectangular in cross section, and the end sections are pivoted to the body sections, being free to turn thereon by pivot pins 24. The body section near each of its ends is provided with an opening 25, extending through from top to bottom, and in each opening a clamp D is adjustably placed.

What may be termed the automatic form of clamp is that illustrated in Figs. 6 and 8, and it comprises a shank 26, a portion of which extends upward through an opening 25, the lower portion of the shank having clamping engagement with the bottom of the body of the stick or carrier, and the said lower portion of the shank of the clamp is provided with two jaws 27 and 28, one of the jaws, the jaw 28, for example, being movable and spring controlled, the springs serving to normally retain the jaws in a closed position. The spring-controlled jaw is provided with an arm 29, preferably a crank arm, by means of which it may be opened, and when this crank arm is brought in engagement with a trip block 20 heretofore described, and located at the receiving end of the machine, the said block will serve to open the spring-controlled jaw of the clamp and keep it open during such contact, the lower portion of the trip block being beveled, as shown in Fig. 7. The clamp is held in place preferably by a lock nut 30, screwed upon its upper end to an engagement with the stick or carrier.

The guides 15 and 16 are employed one to support the body of the stick and the other the pivoted end thereof as the stick or carrier is being carried upward to receive the sheet, and for a time after the sheet has been placed in the clamp. The object of making the innermost guides 16, or those supporting the body, shorter or smaller than the outermost guides 15, is that the body of a stick or carrier will be released from the upper portion of the clamps in advance of the end portions, in order that the body may turn and accommodate the sheet to a predetermined position, and enable the body, as shown in Fig. 2, to incline.

A shaft 31, is journaled at the inner upper end of the standards A, and the said shaft at each of its ends is provided with a sprocket wheel 31^a. A second and substantially parallel shaft is journaled below the shaft 31, the lower shaft being designated as 32, and it is provided at or near each end with a sprocket wheel 32^a. An endless chain elevator belt 33, is made to pass over the sprocket wheels 31^a and 32^a at each side of the machine, and the said endless elevator chain belts, at their upper stretches, are made to pass over the horizontal portion of the guides 13^a, as shown in Fig. 2. The upper ends of these chain belts pass over sprocket wheels 34, loosely mounted upon a shaft 35, journaled in suitable bearings at the upper receiving end of the main portion of the frame. This shaft is provided near each loosely mounted sprocket wheel 34 with a fixed sprocket wheel 36, and a drum 37, is secured upon the shaft between the said fixed sprocket wheels as shown in Fig. 5. The drum is provided with a longitudinal slot 38, as shown in Fig. 2.

A drum 39, is loosely mounted upon the upper shaft 31 at the receiving end of the machine, and a parallel shaft 40 is journaled in the upper portions of the guides 13^a, said shaft being provided with a drum 41 fixed thereon, and tapes 42 are stretched over the drums 39 and 41, the tapes being preferably endless, as shown in Fig. 2. These tapes extend at predetermined intervals apart over the space between the upper stretches of the chain elevator 33, as illustrated in Fig. 5. Upon the rear end of the shaft 35 carrying the drum, a sprocket wheel 43 is secured, connected with a similar wheel 44 upon the said shaft 40 by a chain belt 45, as shown in Figs. 2 and 5.

Below the drum shaft 40, a parallel shaft 46 is journaled in bearings attached to the main frame, and this shaft, at its rear end, carries a large chain wheel 47, connected by a chain belt 48 with a sprocket pinion 48^a located upon a power shaft 48^b, which may be suspended from the ceiling or an over-head

support, as shown in Fig. 1. This shaft 46, extends from the rear to the front of the machine frame, and at the front is provided with a pinion 49, illustrated in Fig. 1; and said shaft at the rear of the machine carries a sprocket wheel 50, connected by a chain belt 51 with a sprocket wheel located upon a drive shaft 52, and said shaft may be the drive shaft of the coloring machine. This shaft is provided with a gear 53, which meshes with a gear upon the parallel shaft 54[a], and the said shaft is connected by a chain belt 55 with a pulley 61 located upon the shaft 31 carrying the chain elevator. Thus it will be observed that the elevator moves at the same rate of speed as the cylinder of the coloring machine employed, since said cylinder would be driven from the shaft 52.

The upper run of the machine consists of two endless chain belts at each side, designated respectively as 57 and 67. The forward chain belts 57 are passed over the sprocket wheels 36 fast upon the drum shaft at the receiving end of the frame, and over sprocket wheels 58 secured upon the shaft 59, transversely journaled near the rear portion of the frame which shaft carries a drum 60, having a longitudinal opening 61 therein, as in the construction of the drum 37. The endless chain or conveyer belts 57 of the upper run are connected by slats 62, extending from one belt to the other, and tapes 63 are secured to these slats, and therefore travel with the said chain conveyer belts. The lower stretch of each conveyer belt 57, is made to pass over a tension sprocket 64 and over an idler 65, while the slack portion of the tapes occurring at the wheels 64 and 65 is made to pass over a guide roller or rollers 66, as shown in Fig. 4. The upper stretch of each conveyer belt 57, is supported by a guide 13, while that portion of the lower stretch which is straight is protected by a lower guide 14.

The conveyer belts 67 heretofore referred to as constituting a portion of the upper run, are located one at each side of the machine, the upper stretch being likewise supported by the guides 13. The rear conveyer belts or sections of the upper run are made to pass over sprocket wheels similar to those designated as 58, and likewise secured upon the drum shaft 59, while the outer or rear ends of said belts are made to pass over sprocket wheels 68, mounted in adjustable bearings 69, whereby the slack of the belts may be taken up at any time. That end of the frame opposite the receiving end is designated the rear end in order to more conveniently locate the parts, while as heretofore, one side will be designated the front and the other the rear side.

All of the chain belts heretofore mentioned, and those that are to be hereinafter mentioned, with the exception of the driving belts, are provided with pins 70 in their outer faces, the pins being located at predetermined distances apart, and they are adapted to bear against the sticks or carriers C, to assist the conveyers in conducting said sticks or carriers from place to place, or from point to point in the machine. The conveyer belts of the upper stretch are rotated in the following manner, namely: A driving chain belt 71, is driven from the power shaft 48[b], as shown in Fig. 1, and imparts motion to a counter shaft 72, the shaft 72, through the medium of a belt 73, shown particularly in Fig. 4, being made to impart motion to a shaft 75, through the medium of a sprocket wheel 74, located upon the rear end of the said shaft. The shaft 75, extends from the rear to the front of the frame, and is located beneath the inner or rear drum shaft 59, and the shaft 75 is provided at its front end with a pinion 76, meshing with a gear 77, secured upon the said drum shaft 59, and imparting movement thereto, the said drum shaft in its turn imparting motion to the two belts of the upper run in the same direction, namely, from the direction of the receiving end to that of the rear end of the frame.

The lower run, or that which is supported by the lower guides 11, consists of two belts designated respectively as 78 and 78[a], located at each side of the frame, the belts being chain belts and provided with fingers or pins 70. The section 78 of each conveyer belt of the lower run is what may be termed the forward section, or that which conducts the sticks or carriers to the receiving end of the frame. This section is much the longest, and extends well to the rear end, where it is met by the shorter section 78[a].

The upper and the lower runs are connected at the rear end of the frame through the medium of segmental tracks 79, the said tracks meeting the lower run and being curved over the upper run. A plate 80, is secured to the inner face of the upper guide 13, at the rear end of the frame, as shown in Fig. 4. The said plates, since one is located at each side, project a slight distance above the upper conveyer belts 67, and receive the sticks or carriers C, holding them stationary until a suitable device removes them, and conducts them down the tracks 79 to the rear sections of the lower run of conveyers. The device that is usually employed is best shown in Fig. 4, and consists of two conducting arms 81, one located at each side of the machine, being secured at their centers each upon a short shaft 81[a], journaled in suitable bearings upon the rear standard of the frame. The arms are each provided with a recess 82 at each end, the recess being closed at one end by a wall 83, and normally closed at its opposite end by a slide 84, the slides at opposite ends of the arm being upon opposite edges. Each slide moves over a pin 85 against the tension of a spring 86, the pin being supported by a bracket 87, secured to the arm, and the spring acts to keep the arm 84 with which it is connected beyond the recessed end of the arm, forming thereby the other wall for said recess.

Each shaft 81[a] has secured upon it a large

gear 88, which meshes with a second large gear 89, both of these gears being upon the outside of the frame, one set at the front and the other at the rear side. The gears are revolved by pinions 90, meshing with the uppermost of the gears and secured upon a shaft 91, that extends from the front to the back of the machine, and is provided with a pulley at its rear end, connected by a chain belt 92 with a pulley located upon the rear end of the drum shaft 59.

A trip plate 93, is located upon the inner surface of the front and rear of the frame at the top portion of the rear end, the location of the trip plates being such that in a rotation of the conducting arm 81 projections from the slides 84 will strike the said plate, and as the arm is carried rearward will draw the slide down, exposing the uppermost recess 82 in said arm. Each arm 82 moves twice as fast as the upper conveyer belts, and when one end of an arm is receiving the stick or carrier from the upper run, the opposite end of the arm will be delivering a stick to the lower run. Therefore, in the operation of these arms 81, when the upper end enters upon a trip plate 93, and said plate draws downward the upper latch 84, the stick which is resting upon the top retaining plate 80, will be received in the upper recess of an arm, and as the stick is thus received the trip plate will have disengaged from the latch and will have been restored by the spring to its normal position, holding the stick between the walls of the recess. In this manner, the stick is conducted down the tracks 79 until the stick reaches the lower ends of said tracks, meeting the rear sections of the lower run, at which time the arms will have passed by the sticks, permitting them to be carried in direction of the receiving end of the machine.

When the wet sheets were received at the receiving end of the machine, they were conducted upward by the elevators 33, the uncoated side resting upon the tapes 42, thus preserving the sheets from curling, and the sheets were still held in connection with the tapes, namely, in substantially a horizontal position, while traveling upon the forward sections 57 of the upper run, leaving the tapes only when the carriers entered upon the rear sections of the upper run, whereupon the sheets will have been sufficiently dried to remain smooth and in perpendicular position. The sheets, however, when delivered from the upper run to the lower run, will be sufficiently wet to stick to one another if placed sufficiently close for contact. Therefore, the pins upon the receiving or rear sections of the lower run are placed farther apart than the pins upon the forward sections of the same run. Hence, the sections 78ª, must travel much faster than the sections 78 of the lower run, and the pins upon the rear or receiving sections 78ª are so placed that it will be impossible for one sheet to contact with another under ordinary circumstances.

The manner in which the rear sections 78 of the lower run are propelled is as follows: A pulley is secured upon the rear end of the drum shaft 59, as shown in dotted lines in Fig. 4, connected by a link or chain belt 94, with a larger pulley 95, secured upon the rear end of the shaft 96, journaled near the rear portion of the frame above the guides 11, and extending from front to rear of the machine. At both the forward and rear ends of this shaft 96 a sprocket wheel 97 is secured, and the said sprocket wheels are connected by chains 98 with sprocket wheels 99, located upon a shaft 100, journaled beneath the lower end of the tracks 79, which shaft likewise has secured thereon two other sprocket wheels, one near each end, over which the chain belts constituting the rear sections 78ª of the said lower run are made to pass, while the forward ends of said belts pass over suitable sprocket wheels loosely mounted upon a shaft 101, journaled in the guides 11. The chain or link belts constituting the forward sections of the lower run are made to pass over sprocket wheels 102, likewise loosely mounted on the shaft 101, while the forward ends of the forward sections of the lower run are made to pass over sprocket wheels 103, journaled at the forward or receiving end of the frame and extending from front to rear, one of the sprocket wheels being shown in Fig. 3, and is designated as 104. This shaft is revolved through the medium of a large gear 105, located upon its forward end, as shown in Fig. 1, and meshing with the pinions 49 on the shaft 46 driven from the power shaft. The sheets were received from the table at the receiving end of the machine by opening the jaws of the carrier clamps through the medium of the attached arms 29 engaging with the trip blocks 20. The sheets may be substantially in the same manner automatically released from the carriers on the lower run near the receiving end of the machine, being at that time properly dried. This is ordinarily accomplished in the following manner: A plate 106, is adjustably located upon the inner face of each guide 11, as shown in Figs. 2 and 6, the said plates being provided with a releasing rib or track 107; and immediately beneath this plate, an adjustable receiving box 108 or the equivalent thereof is suitably supported. As the sheets approach this box, which is inclined, they are received in the box, and about the time that their free ends have been laid in the box the crank arms of the clamps holding the upper end of the sheets will have been engaged by the releasing ribs 107 and the jaws opened, as shown in Fig. 6, releasing the upper end of the sheet, which will likewise fall to a bearing in the box; but it will be understood that any desired form of clamp may be employed, as well as carrier, and that instead of automatically operating, the sheets may be placed in the clamps by hand and removed in like manner.

Beneath the various drums, heating pipes

109 of any approved character are preferably placed in order to facilitate drying. The empty sticks or carriers are returned to the receiving end of the machine in order that they may again receive sheets and conduct them through the drying portion of the machine. This is accomplished by loosely mounting sprocket wheels 110 upon the forward lower shaft 103 located upon the main frame of the machine, journaling below said shaft a second shaft 111 carrying sprocket wheels 112, and preferably adjustably securing upon each side of the frame of the coloring machine B, brackets 113 carrying sprocket wheels 114, while another shaft 115 is journaled in the standards A, below the lower portion of the front main guides 15, as shown in Fig. 2. This upper forward shaft is provided with two sprocket wheels 116, and the return conveyer to be carried by the sprocket wheels 110, 111, 114 and 116, consists of two endless chain or crank belts, located one at each side of the machine frame, being provided with the aforesaid fingers 70. The upper stretches of these belts, which are designated as 117, lead directly to the space between the lower portions of the guides 15 and 16, being on a level with the larger guides 15, while the lower stretches of the elevator belts 33 will be on a level with the lower portions of the smaller guides 16, and the upper stretches of the elevator belts will be on a level with the upper portion of these same guides, as is shown in Figs. 2 and 7. The return conveyers 117 are driven by chain belts 118, passing over suitable pulleys on the shaft 115, and over pulleys carried by the driving shaft 52. Thus the return conveyer will travel at the same rate of speed as the elevator.

In the operation of this machine, the sheets are taken from the table at the receiving end of the machine by the clamps of the sticks passing up between the guides 15 and 16. As the carriers pass out from the guides their body portions turn so that the sheet received may be drawn along upon the upper tapes 42 beneath the elevator. In the same manner the sheets are conducted along the forward sections 57 of the upper run of the machine, and when the sheets are delivered from these sections of the upper run by the carriers passing to the rear sections 67 of the same run, the sheets fall to a perpendicular position, and no matter how wet they may have been will not curl to any appreciable extent. The carriers as they approach the end of the upper run are received upon the returning plate 80, and are conducted therefrom by the arms 81, and are then conducted to the rear swiftly traveling sections 78ª of the lower run. Thus these sections or carriers are spaced a suitable distance apart, to prevent, as heretofore stated, the sheets touching one another, and when the carriers reach the forward end of this section 78ª they will be taken up by the forward sections 78 of the same run, the pins 70 of this section being quite close together. When the carriers reach the receiving box 108, the sheets are released automatically in the manner heretofore described, and the empty sticks or carriers continue forward until they are received by the returning conveyer belts 117, which run along the forward guides 15 and 16, where they will be taken up by the fingers 70 on the lower stretch of the elevator belts 33. In this manner any number of sheets, no matter how wet or how thickly coated they may be, may be expeditiously and conveniently dried without danger of their buckling, curling, or sticking together, and an attendant need only place the sheets upon the distributing table of the machine, or such an attendant may be dispensed with if means are provided for automatically delivering the sheets to the table from the coating machine.

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

1. In a machine for drying coated material in sheet form, conveyers suitable carriers and tapes located beneath the conveyers, the said tapes being adapted as supports for the sheet, as and for the purpose specified.

2. In a machine for drying material in sheet form, conveyers, carriers located upon the conveyers, provided with clips to receive sheets, and tapes located beneath the conveyers, adapted as supports for the sheets, as and for the purpose specified.

3. In a machine for drying coated sheet material, a series of runs, said runs consisting of belts provided with projections from their outer faces, a conducting mechanism located between the runs, carriers adapted to be conveyed by the belts of the runs and to be received by the conducting mechanism, tapes located beneath the initial runs, adjacent thereto, adapted to support the sheet in substantially a reclining position, as and for the purpose specified.

4. In a machine for drying coated sheet material, a series of runs, said runs consisting of belts provided with projections from their outer faces, a conducting mechanism located between the runs, carriers adapted to be conveyed by the belts of the runs and to be received by the conducting mechanism, tapes located beneath the initial runs, adjacent thereto, adapted to support a sheet in substantially a reclining position, the initial runs being constructed of independent belts, the receiving belts having greater speed and the fingers spaced farther apart than upon the discharging belt sections of said run, as and for the purpose set forth.

5. In a machine for drying coated sheet material, the combination, with a series of runs, the initial runs being provided with tapes located beneath them and adapted to support the sheets in a reclining position, the initial run having its receiving section driven at a greater rate of speed than its delivery section, and provided with fingers spaced farther

apart than those on the delivery section, and carriers adapted to be carried by the said runs and provided with clips for grasping and holding the sheets, of conducting arms, a track connecting the runs, in connection with which the conducting runs rotate, the said arms being constructed at their ends to receive carriers from the final section of the first run, delivering the said carriers to the receiving section of the final run, as and for the purpose specified.

6. In a machine for drying coated sheet material, the combination, with a series of runs, the initial runs being provided with tapes located beneath them and adapted to support the sheets in a reclining position, the initial run having its receiving section driven at a greater rate of speed than its delivery section and provided with fingers spaced farther apart than those on the delivery section, and carriers adapted to be carried by the said runs and provided with clips for grasping and holding the sheets, of conducting arms, a track connecting the runs in connection with which the conducting runs rotate, the said arms being constructed at their ends to receive carriers from the final section of the first run, delivering said carriers to the receiving section of the final run, trip devices located near the commencement of the initial run and near the termination of the final run, the said trip devices being constructed to automatically open the sheet retaining devices located upon the carriers, whereby said devices are in condition to receive a sheet at the receiving end of the machine and discharge the sheet at the discharging end of the machine, as set forth.

7. In a machine for drying coated material, the combination, with an upper and a lower run, and a track connecting the two runs, of conducting arms held to revolve with one end in engagement with the track, the ends of the said arm being provided with recesses, one wall of each of said recesses being slidable and spring-controlled, trips located upon supports and adapted for engagement with the sliding walls of the recesses, and carriers adapted to receive material to be dried and carried by the runs likewise adapted for reception by the recessed portions of the said arms, as and for the purpose specified.

LOUIS DEJONGE, JR.

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JNO. M. RITTER.