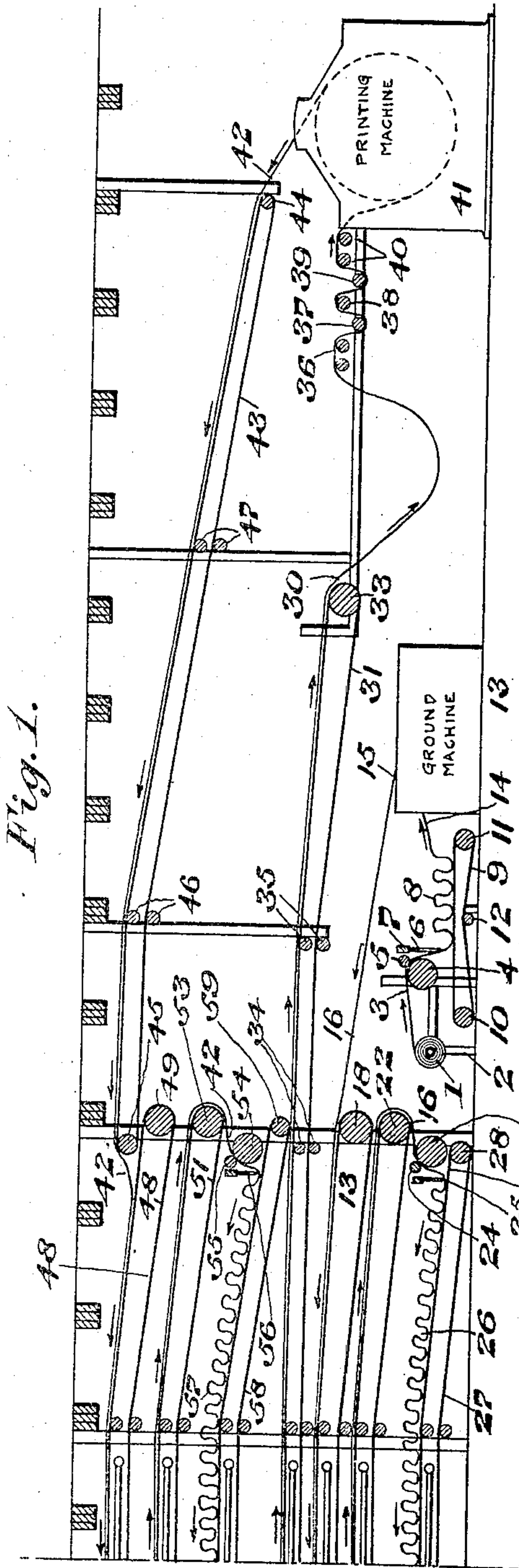


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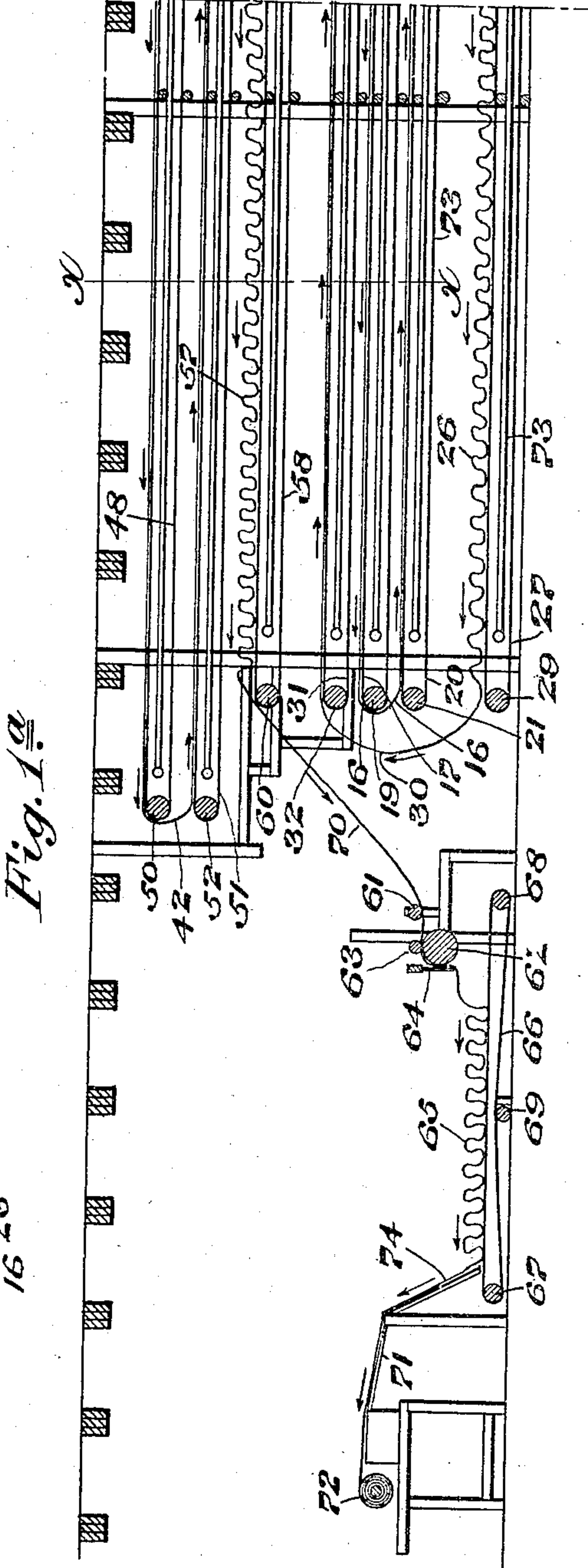
W. VORNHOLD.
WALL PAPER DRYING APPARATUS.
APPLICATION FILED SEPT. 20, 1907.

Patented Mar. 9, 1909.
3 SHEETS—SHEET 1.



Witnesses

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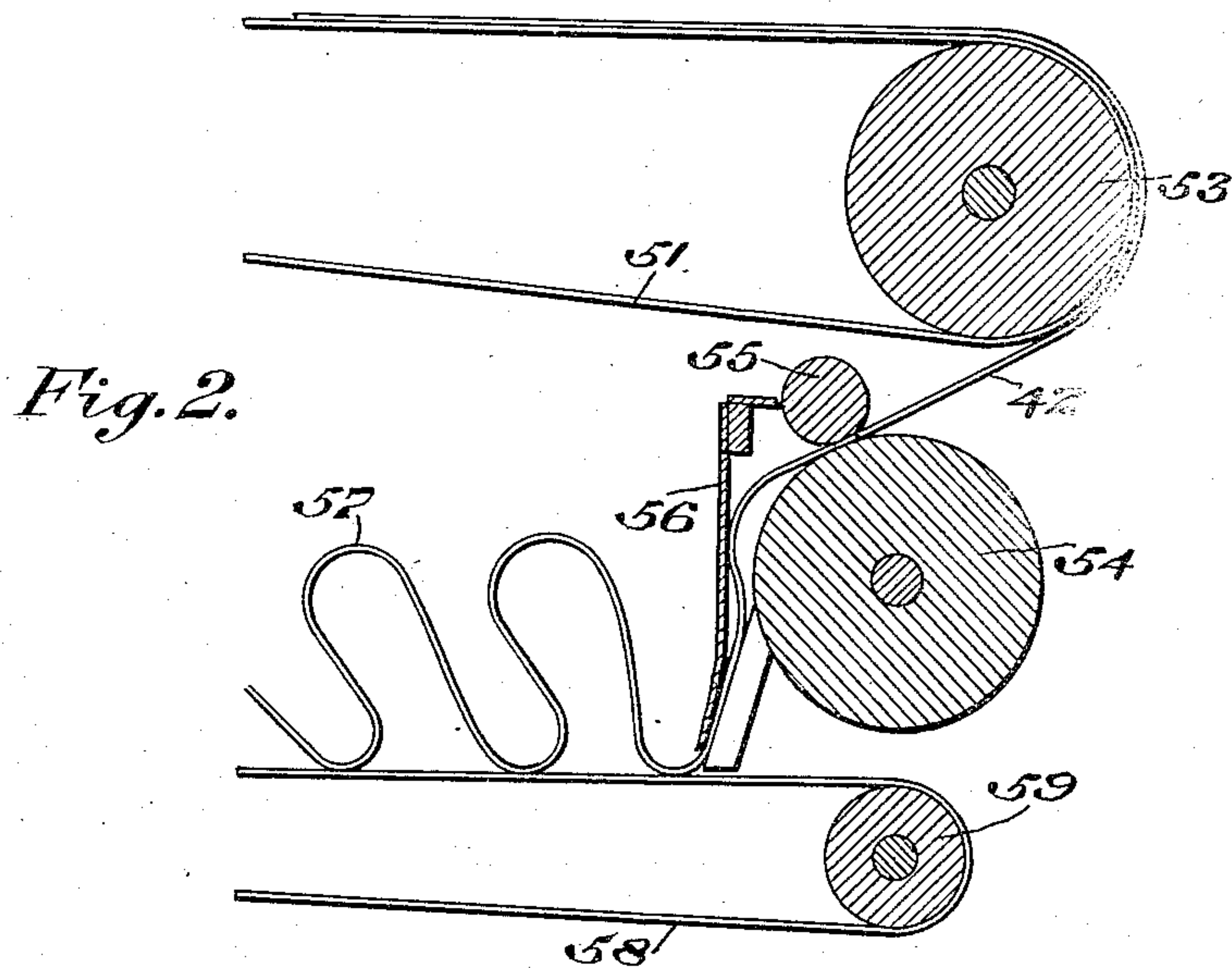
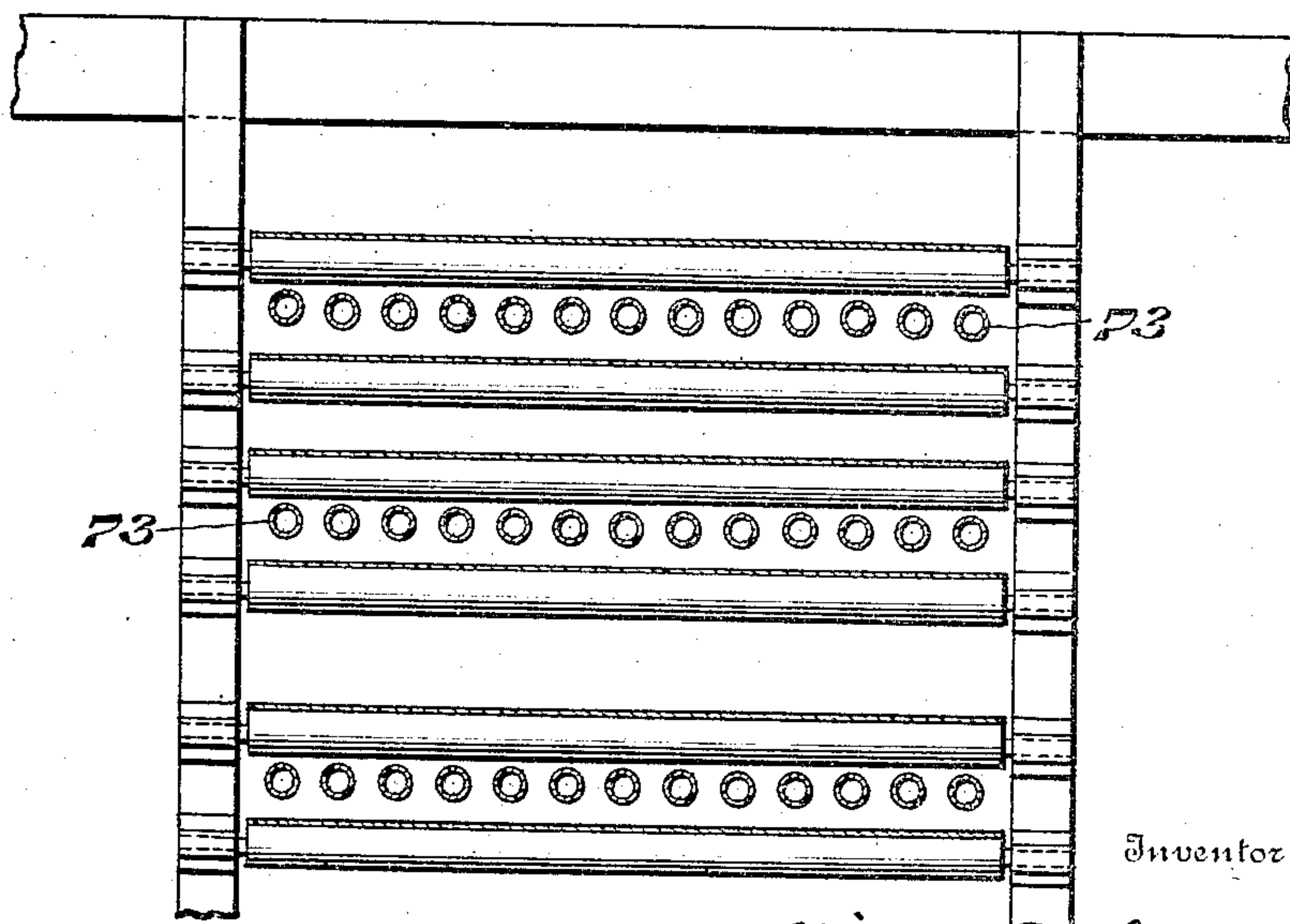


Fig. 3.



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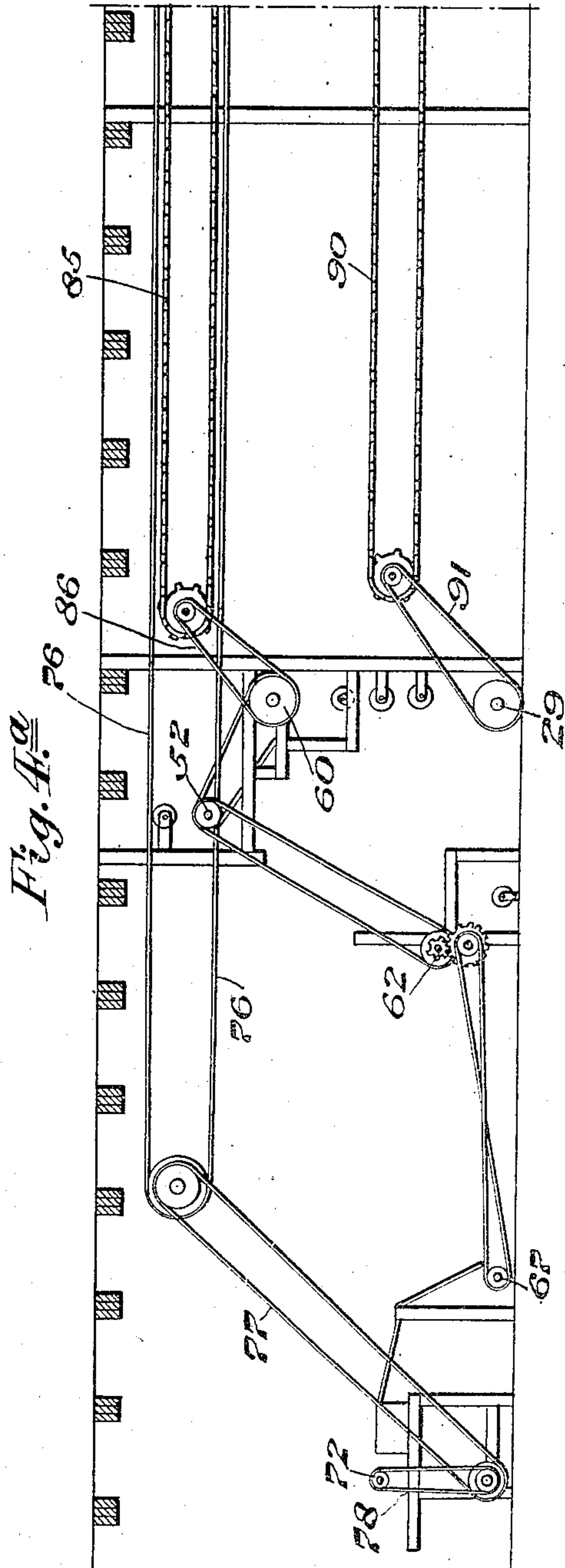
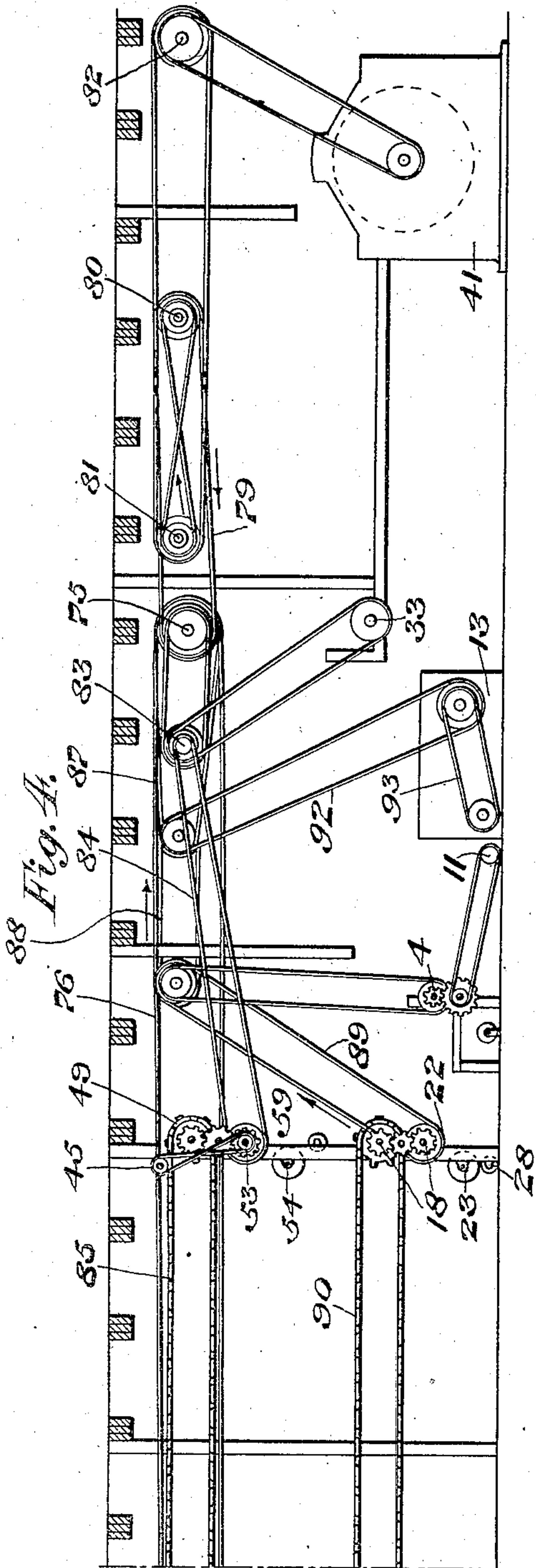
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3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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WALL-PAPER-DRYING APPARATUS.

No. 914,767.

Specification of Letters Patent.

Patented March 9, 1909.

Application filed September 20, 1907. Serial No. 393,827.

To all whom it may concern:

Be it known that I, WILLIAM J. VORNHOLD, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Wall-Paper-Drying Apparatus, of which the following is a specification.

My invention consists of a novel construction of apparatus for printing and drying wall paper wherein I have devised novel means for taking a roll of blank paper and passing the same through the ground machine, wherein the first color is applied, the sheet thereafter passing over suitable feeding and drying devices and then through the printing machine, after which the roll of paper is conducted over additional guiding and drying devices and subjected to further treatment. When in the finished condition, it is wound upon the roll ready for shipment, the operating being performed automatically and requiring less labor and attendance than heretofore.

An additional feature of my invention consists in the special arrangement of devices whereby the material is more efficiently dried, and larger quantities of material are acted upon in a given length of space and less help is required to operate the same.

For the purpose of illustrating my invention, I have shown one form of apparatus which I have found in practice to produce effective and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown.

Figure 1 represents a vertical sectional and diagrammatical view of the right hand portion of an apparatus for printing, treating and drying wall paper, embodying one form of my invention. Fig. 1^a represents a similar view of the left hand portion of the apparatus. Fig. 2 represents on an enlarged scale, a sectional view of a structure similar to that shown in the lower portion of Fig. 1^a. Fig. 3 represents on an enlarged scale, a section on line *x-x*, Fig. 1^a. Fig. 4 represents a side elevation of the power transmission means in the right hand end of the apparatus. Fig. 4^a represents the left hand end of the apparatus and is complementary to Fig. 4.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings. In describing my invention, I will begin with the blank and trace the roll of paper from the blank to the finished product during the successive treatments to which it is subjected.

Referring first to Fig. 1, which as stated represents the right hand portion of my machine, 1 designates a roll of blank paper, which is mounted in any suitable supports or framework as 2. In practice the blank roll or reel 1 is usually about three hundred pieces, each piece being eight yards in length, the roll or reel being placed in position as it comes from the paper mill. The paper 3 from the roll 1 passes over the feed roller 4, which it will be understood is driven by any suitable means, the blank sheet 3 being fed between the feed roller 4 and the iron holder 5 located directly above it, substantially as seen in the lower portion of Fig. 1. The sheet 3 next passes under the strip 6 of canvas or other material depending freely from its support 7, in order to make festoon 8. The paper from the roll travels at a rate of speed in excess of the rate of an endless belt or apron 9, which passes around rollers 10 and 11, of which the roller 10 is preferably driven while the roller 11 revolves in its bearings. Any slack of the apron is taken up by the roller 12. It will be seen that the paper passing out from beneath the sheet or curtain 6 at a rate of speed in excess of the apron 9 tends to curl or turn up into shapes of the character indicated in the lower portion of Fig. 1, the curtain or sheet 6 being raised at intervals by the paper to permit the curved wave of the festoon to pass thereunder, dropping immediately to exert a retarding or dragging effect upon the sheet in order to form the next festoon. This is more fully set out in connection with Fig. 5.

The festoons 8 supply paper for the ground machine 13 as indicated at the point 14, this machine being timed to take the paper at the same speed as that of feed roller 4. In the ground machine the first color is placed on the paper, the blank leading or emerging from the ground machine 13 as indicated at 15 and the blank with the first color thereon, as indicated at 16, now passes over the endless apron 17

which travels over the rollers 18 and 19, the roller 18 being shown in Fig. 1 and its coacting roller 19 being shown in Fig. 1. The paper 16 after passing over the apron 17 passes downwardly upon the apron 20 which travels over the rollers 21 and 22. The paper 16 passes thence over the feed roller 23 above which is located the iron roller 24, said paper 16 passing under the strip 25 of canvas or other suitable material, whereby the festoons 26 are formed, which are supported upon the slow speed apron 27, which passes over the rollers 28 and 29. The festoons 26 are opened at the opposite end of the apron and after leaving the apron 27, appear as indicated at 30 in Fig. 1^a and pass over the apron 31 which travels on the rollers 32 as seen in Fig. 1^a and the roller 33 seen in Fig. 1, said apron 31 being supported in its travel by the rollers 34 and 35 which are arranged in pairs, as indicated in Fig. 1. After passing to the right of the roller 33, the strip 30 passes over the rollers or tension devices 36, 37, 38, 39 and 40, as indicated in Fig. 1, passing thence into the printing machine as indicated at 41, in which latter the printing is effected, it being apparent from the foregoing that the paper has received its first color in the ground machine and has been sufficiently dried and thereafter having received the desired impression from the printing machine 41. It will be apparent that it only remains to properly dry and reel the paper for shipment, which operation will now be described. The strip of paper after leaving the printing machine 41 will now be indicated as 42 and passes over the apron 43, which travels over the rollers 44 and 45, the intermediate portion of the apron being supported by the pairs of rollers 46 and 47, as indicated in Fig. 1. After passing to the left of the roller 45, the strip 42 travels over the apron 48, which is supported on the rollers 49 and 50, thence passing downwardly as indicated in Fig. 1^a upon the apron 51 which is supported upon the rollers 52 and 53. The strip 42 after passing down and under the roller 53 passes over the feed roller 54 upon which is an iron roller 55 and thence under a strip 56 of canvas or other suitable material, whereby the festoons 57 are formed, which are supported by the apron 58 which passes over the rollers 59, seen in Fig. 1 and the roller 60 seen in Fig. 1^a, the festoons 57 now disappearing into strip form again, as seen at the left of Fig. 1^a, and to which I have applied reference 70 and passing under a tension device 61 and thence over the rollers 62 and 63 and under the strip 64 of canvas or similar material, whereby the festoons 65 are formed.

66 designates the apron supporting the festoons 65, said apron passing over the

rollers 67 and 68 and being kept taut by the roller 69. The festoons 65 after leaving the apron 66, pass as indicated at 74 over the slide 71 and thence on to the reel 72, upon which the paper in its finished condition is wound in practice the length of sixteen yards.

It will be understood that in practice the rollers 49, 53 and 54 are caused to rotate in unison and serve to cause the proper movement of their respective aprons and the paper traveling thereover. In practice I employ suitable belting or power transmission devices common to the rollers 49, 53 and 54, so that the same are caused to rotate in unison in the proper direction. It will also be understood that the rollers 18, 22 and 23 are actuated in unison in the proper directions by suitable power transmission devices. It will also be understood that the rollers 52 and 62 seen in Fig. 1^a are connected by proper belting or power transmission devices, so as to cause the same to be driven in unison.

It will be understood that the proper drying of the sheet or strip of paper during its travel over the various aprons is effected by means of the piping 73, which may be used for steam or hot air. I have purposely omitted to show the source of supply of steam or hot air, as it will be understood that the heating medium may be taken from any suitable source and the various series of heating pipes can be coupled up in any suitable manner, as will be evident to those skilled in this art. The structure by which these various relations and movements of the aprons are maintained is set out in Figs. 4 and 4^a.

It will be understood that in practice the reel 72 revolves at a very high speed and that the same receives its power as indicated in these Figs. 4 and 4^a, various shafts, belting, pulleys and speed devices being indicated therein. Starting with the main shaft 75, the power is transmitted through the main belts 76, 77 and 78 with a constantly increasing speed to the final pulley connected to the reel 72. The ground machine and printing machine are driven by a system of belting, the printing machine being driven from the main shaft 75, by means of belt 79, cone pulleys 80 and 81 and shaft 82. The ground machine is driven, as clearly shown in Fig. 4, by belts 87, 92 and 93. Special provision has to be made for driving the various aprons which support the festoons of wall paper in the drying room and before entering the ground machine and after leaving the drying room, in order that the tight side or face of said aprons will be on top thus giving a straight and smooth surface for supporting said festoons. The apron 58 in the drying room is driven from the main shaft through belts 84, chain gear-

ing 85, and belt 86, as is clearly seen by reference to the figures. Apron 27 in the drying room is driven by means of belts 87, 88, 89, chain gearing 90, belt 91 and shaft 29.

5 The apron 66 which supports the festoons just before delivery to the winding reel or drum 72 is driven from the shaft 60 through shafts 52, 62 and 67.

Referring to Figs. 1 and 1^a, the festoons 10 57 and 26 are shown supported upon the aprons 58 and 27 respectively. It clearly appears from the views by tracing the surface of the wall paper that in the given length of the aprons 58 and 27, several times 15 such length of wall paper is exposed to the drying atmosphere of the drying room.

Referring to Fig. 2 details of a festoon former are shown which operates substantially as follows:—The wall paper after 20 passing over the feed roll 52 passes down the space between the inner surface of the depending strip 56 of canvas or similar material and the surface speed of the feed roll 54 is considerably in excess of the surface 25 speed of the apron 58 and consequently the wall paper after coming in contact with said apron is forced up and outwardly away from said feed wall and continues horizontally with the movement of said apron until 30 said canvas strip passes over the upper surface of the festoon, and falls back into place again, the above operation being repeated and a continuing series of festoons formed. The other festoons are made in like manner.

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

1. In a device of the character described, a ground machine, a delivery reel, a festoon 40 former, a festoon carrying apron, drying aprons for carrying a smooth surface of wall paper and drying aprons provided with festoon formers.

2. In a device of the character described, 45 a printing machine, drying aprons for carrying a smooth surface of wall paper and drying aprons provided with festoon formers.

3. In a device of the character described, 50 drying aprons for carrying a smooth surface of wall paper, and aprons provided with festoon formers for increasing the amount of exposed drying surface carried thereby.

4. In a festoon former, the combination 55 of a feed roller, a retaining roller, a depending strip of flexible material substantially parallel to the surface of said feed roller and adjacent thereto, a horizontally disposed apron for receiving said festoons as 60 formed, and a guide for the wall paper between said apron and said feed roller.

5. In a device of the character described, a delivery reel, a festoon former and a slow 65 speed festoon carrying apron, a ground machine, aprons for receiving and carrying the

paper in a smooth sheet, a second festoon former, a second slow speed festoon receiving apron, a drying apron at speed, a printing machine, receiving and carrying aprons, a third festoon former, a third slow speed 70 festoon carrying apron, a fourth festoon former, and festoon carrying apron and a receiving or winding reel at speed, the paper being acted upon serially by all of the same.

6. The combination of a delivery reel, a 75 festoon former, a ground machine, smooth surface drying aprons, a festoon former, a smooth surface drying apron, a printing machine, smooth surface drying aprons, a festoon former, a winding reel all at speed, 80 slow speed festoon carrying aprons interposed in the series of devices, after every festoon former and suitable power transmission devices such that the requisite speed relation is obtained. 85

7. In a device of the character described, a plurality of printing means, a plurality of belt carriers moving at the same peripheral speed as the printing means, and a belt carrier between the said other belt carriers, moving at a slower peripheral speed 90 than the printing means, and means for placing the material carried upon a slower belt in predetermined arrangement.

8. In a device of the character described, 95 a plurality of printing devices, a plurality of belt carriers moving at the same peripheral speed as the printing devices, a belt carrier moving at a slower peripheral speed than that of the printing devices, and a festoon forming device over said last belt carrier. 100

9. In a wall paper printing machine, a paper roll holder, an endless carrier in proximity thereto, means for forming festoons 105 thereon, a ground printing machine, a plurality of endless carriers in proximity thereto, traveling at the peripheral speed of the printing machine, an endless carrier traveling at a slower speed, a festoon forming device 110 distributing the paper on said last named endless carrier, tension devices, a second printing machine, a plurality of endless carriers traveling at the same peripheral speed as the second printing machine, an 115 endless carrier traveling at a slower peripheral speed than said second machine, a festoon forming device in proximity to said last named carrier and means for rolling the paper as it comes from said last named 120 carrier.

10. In a device of the character described, a paper roll holder, a carrier, a festoon forming device, a ground printing machine, a second printing machine, a roll forming 125 mechanism and festoon forming mechanism, and endless carriers between the ground machine and the second printing machine, and between the second printing machine and the roll forming mechanism. 130

11. In a wall paper printing machine, printing mechanism, a belt carrier therefor moving at the same peripheral speed as the printing mechanism, a belt carrier moving
5 at a slower peripheral speed and means for distributing the paper upon the said moving carrier in the form of festoons after it leaves the printing machine.

12. In a wall paper printing machine, a
10 paper roll holder, an endless belt, a festoon forming mechanism between the holder and belt at one end of said belt, a ground printing machine at the other end of said belt,
15 a plurality of endless carriers moving at the same peripheral speed as the ground machine and receiving the paper therefrom, a belt having a slower movement receiving the paper from the endless carriers, means
20 for forming festoons of the paper thereon, a second printing machine, a plurality of endless carriers having the same rate of peripheral movement as the second printing machine and receiving the paper therefrom,
25 said last named endless carriers and in proximity thereto, and means for forming the paper in festoons upon said last mentioned belt.

13. In a wall paper printing machine, a
30 drying mechanism comprising feed rollers positively moving the paper, a continuously

movable carrier moving at a slower rate than the paper, a guide, and a flap normally pressing the paper against said guide.

14. In a wall paper printing machine, a
35 continuously movable belt, feed mechanism receiving the paper therefrom, a guide, a depending flap resting against said paper and normally holding it in contact with said guide and an endless carrier in proximity to the guide and moving at a slower
40 rate than the paper.

15. In a device of the character described, feeding mechanism, an endless carrier
45 driven at a slower speed than the peripheral speed of the feed mechanism, means for keeping the upper surface of said endless carrier taut and a festoon forming mechanism between the feed mechanism and
50 carrier.

16. In a festoon former, the combination
55 of a feed roller, a retaining roller, a depending strip of flexible material substantially parallel to the surface of said feed roller and adjacent thereto, a horizontally disposed apron for receiving said festoons as formed, and a guide for the wall paper between said apron and said feed roller.

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