R. HENDERSON.

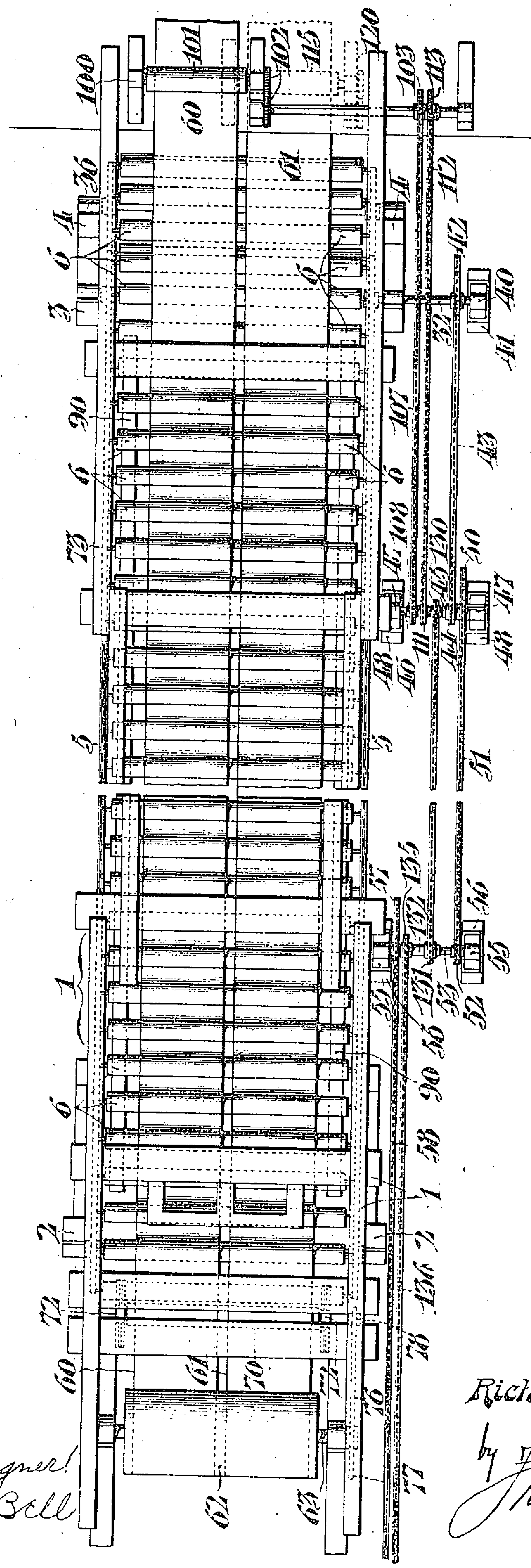
DRYING MECHANISM FOR LONG SHEETS.

APPLICATION FILED JUNE 24, 1909.

966,398. Patented Aug. 2, 1910.

3 SHEETS—SHEET 1.

FIG. I.



Witnesses

John C. Bergner

James H. Bell

Inventor

Richard Henderson

by Finley & Paul

Attorneys.

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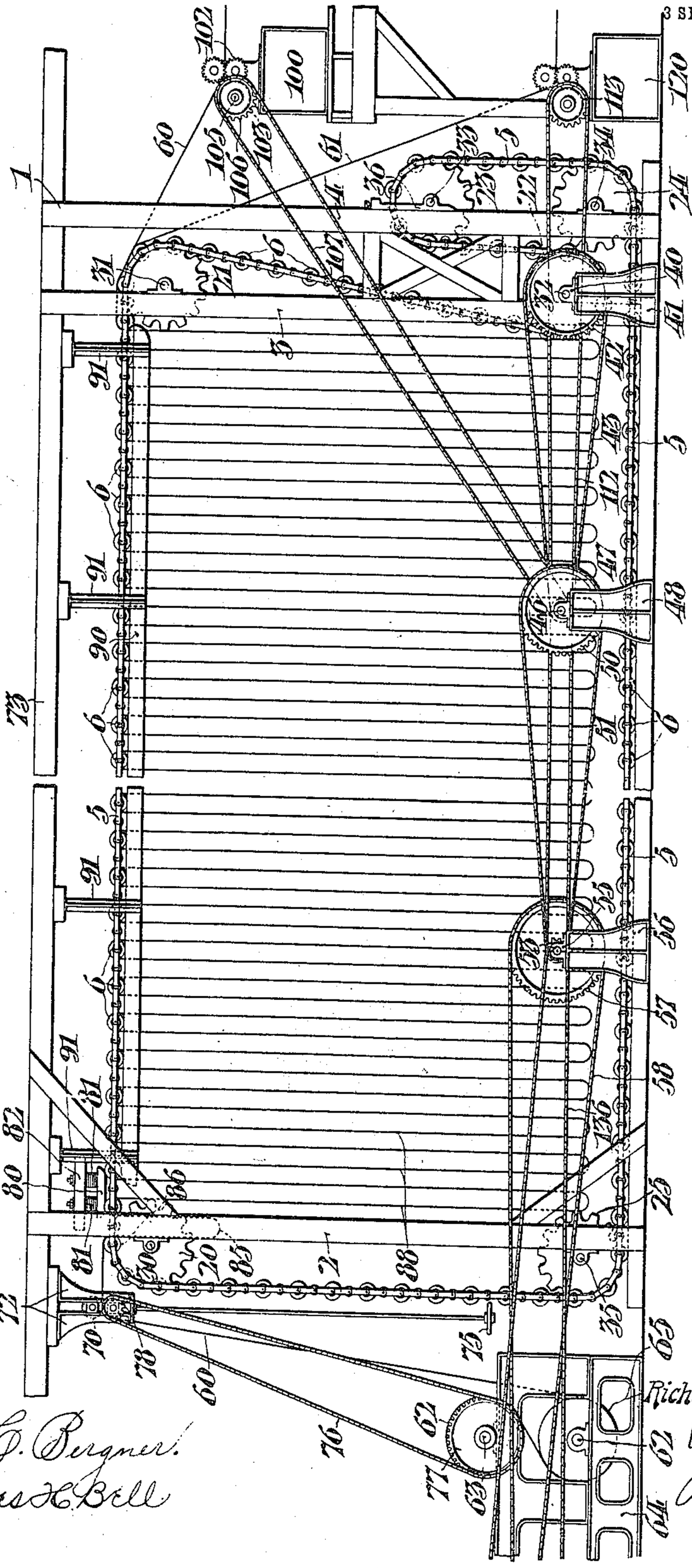
3 SHEETS—SHEET 2.

FIG. II.



Witnesses

John C. Bergner.

James H. Bell

Inventor

Richard Henderson.

by Talley & Lane

Attorneys

R. HENDERSON.

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3 SHEETS—SHEET 3.

FIG. III.

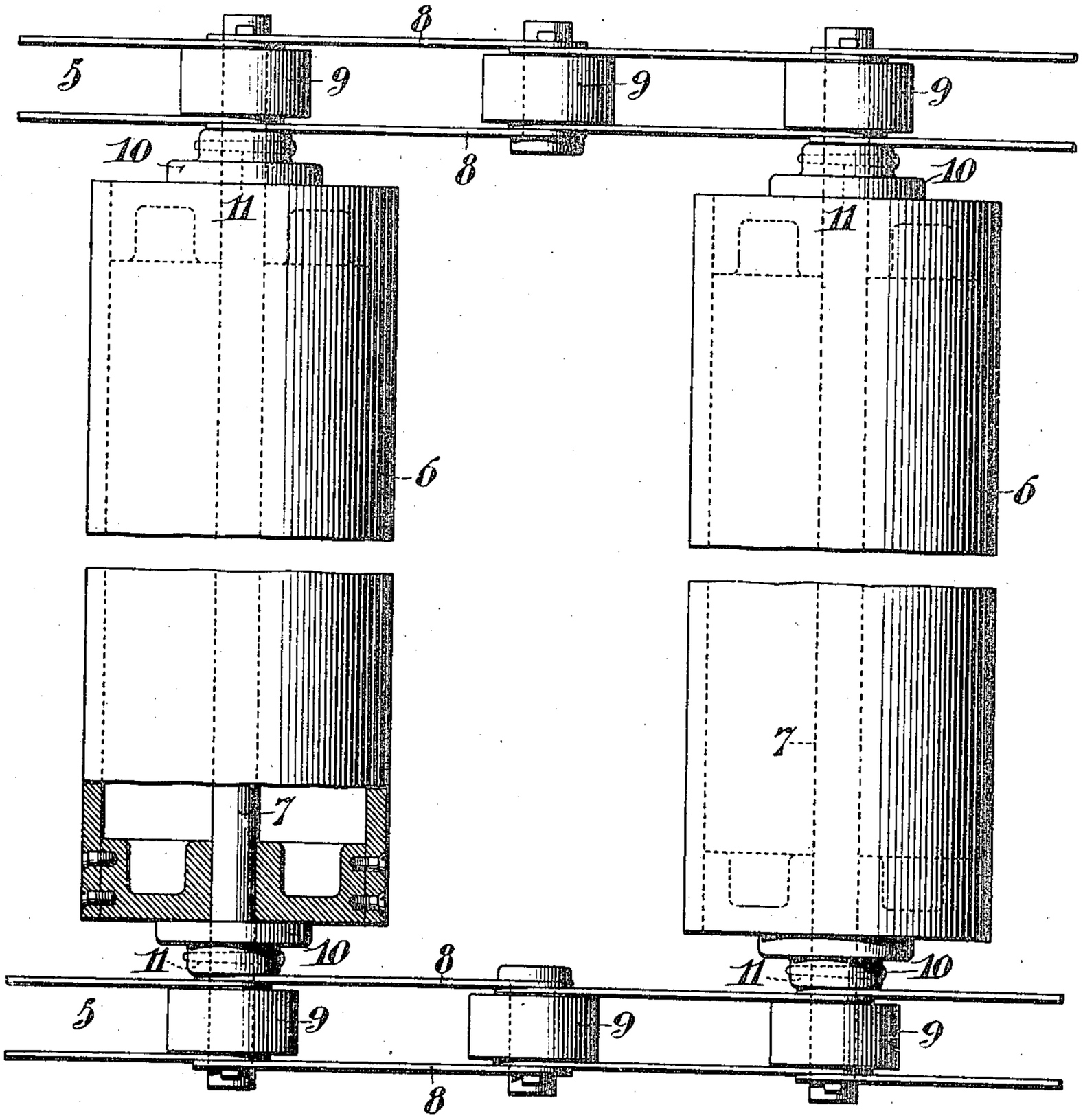
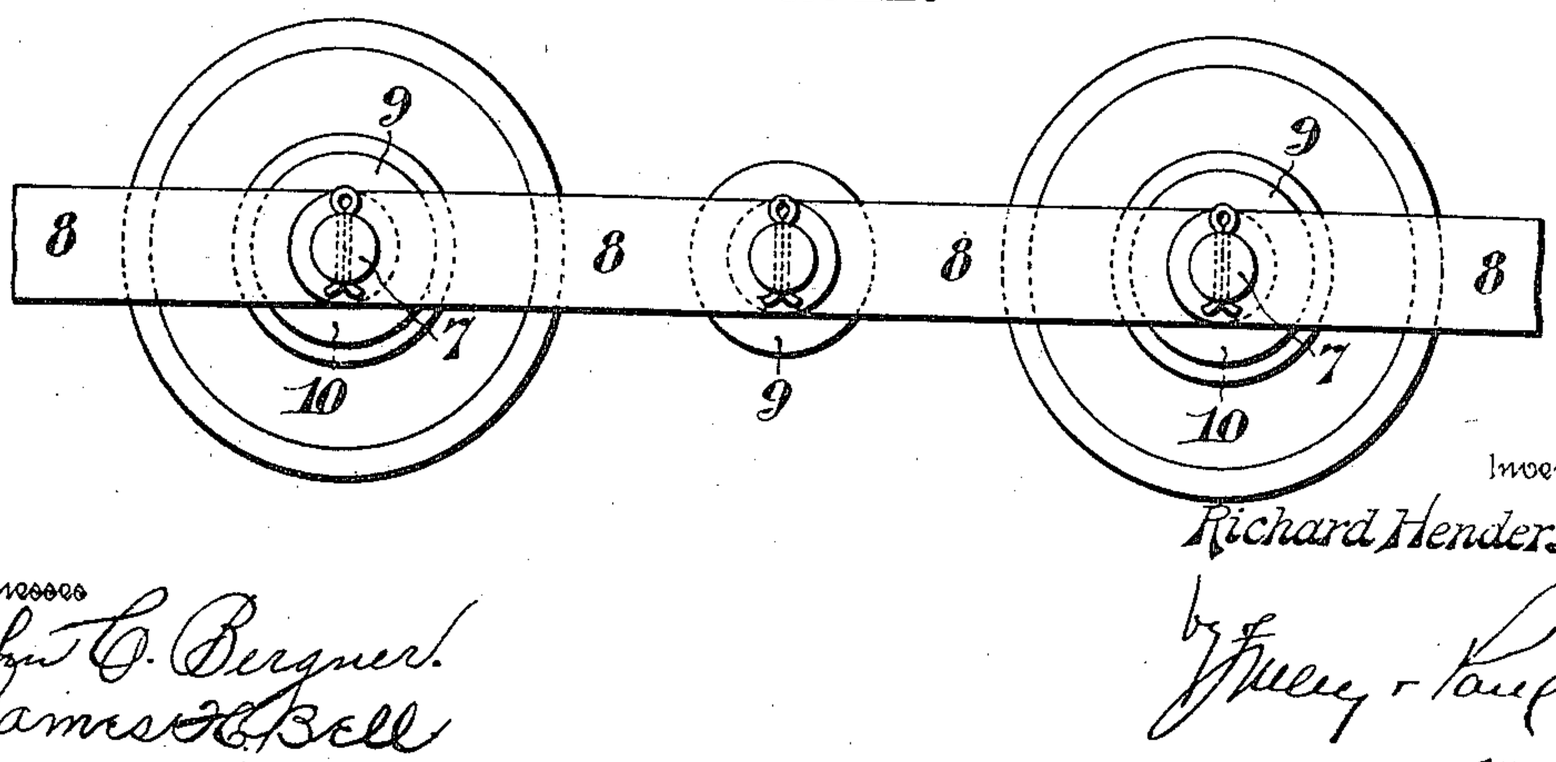


FIG. IV.



Witnesses

John C. Bergner.

James C. Bell

Inventor

Richard Henderson,

by Fulwey & Paul

Attorneys.

UNITED STATES PATENT OFFICE.

RICHARD HENDERSON, OF PERTH AMBOY, NEW JERSEY, ASSIGNOR TO THE BARBER ASPHALT PAVING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF WEST VIRGINIA.

DRYING MECHANISM FOR LONG SHEETS.

966,398. Specification of Letters Patent. Patented Aug. 2, 1910.

Application filed June 24, 1909. Serial No. 503,993.

To all whom it may concern:

Be it known that I, RICHARD HENDERSON, of Perth Amboy, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Drying Mechanism for Long Sheets, whereof the following is a specification, reference being had to the accompanying drawings.

In the drying of lengths of moist sheets, it is customary to festoon the sheets in order to economize space. As the drying mechanism is customarily arranged, the festooned sheet passes slowly from one end to the other of the drying space, hanging from rods or slats which are progressed across the top of said space. During this progression the festoons of the sheet do not alter their relative position, each loop remaining as initially formed until the dried sheet is withdrawn from the mechanism. With some materials this is objectionable, causing an undue accumulation of fluent material toward the bottom of each loop, or causing the sheet to dry or set with permanently curved portions at the top and bottom of the folds, which when the entire sheet is subsequently rolled up may become cracked or distorted. These considerations apply especially to the manufacture of bituminous roofing material. Such material comprises essentially a fabric or felt saturated with or combined with a bituminous semi-liquid material. If a moist sheet of this material is festooned as it passes into a drying mechanism, and if the position of the festoons remains relatively unaltered during its progression through the machine, there is a tendency toward accumulation of bituminous material at the bottom of the folds, resulting in its uneven distribution along the length of the sheet. Likewise, the sheet as it dries receives a permanent set in those portions which form the ends of the successive folds, thus occasioning cracking or distortion when the dried sheet is ultimately wound into rolls for marketing.

My present invention is designed to overcome these difficulties by the provision of means whereby the folds of the moist sheet as they progress are simultaneously moved in relation to each other, so that as the sheet passes through the machine, the points which form the upper and lower ends of the folds are not constant. In this way, I secure a more even distribution of the semi-liquid material as it dries upon the sheet, and also avoid other difficulties to which I have made reference.

While the mechanism which I have invented and am about to describe has been designed with a special view to the drying of bituminous roofing material, it will be understood that its application is not thus limited, but that it is equally applicable to the drying of any moist sheet in which the conditions to which I have made reference obtain.

For the further economization of space in drying mechanism with increase in the output, it is convenient to arrange that the festooning rods or rolls shall carry more than one sheet simultaneously.

I have illustrated my invention of a width to accommodate the parallel progression of two sheets, but it will be understood that the capacity of the mechanism may thus be indefinitely increased.

Where the drying of the moist sheet is to be specially promoted by a heated atmosphere or other similar means, the entire mechanism which I will describe may be contained within a suitable inclosure. I have not so shown my mechanism, as it may be used quite independently of any such special drying compartment.

In the accompanying drawings, Figure I, is a plan view of a continuous drying machine conveniently embodying my invention. It is broken centrally to indicate its indeterminate length. Fig. II, is a side elevation of the same looking from the bottom of Fig. I. Figs. III, and IV, are details of the conveyer chain and its rollers.

In the said figures, 1, 1, represent the side frames of the machine comprising the uprights 2, 3, and 4. The endless conveyer chains 5, having rollers 6, move in a circuitous passage, within the frames 1, 1, in proximity to their inner faces, and over sprocket wheels 20, 21, 22, 23, 24, and 25, which are mounted for rotation upon suitable shafts 30, 31, 32, 33, 34, and 35, respectively, which are journaled within bearings, on the several uprights of the frames 1. The bearings 36, which support the shaft 33, are adjustably mounted on the uprights

4, to permit the regulation of the slack in the conveyer chains 5. The conveyer chains 5, 5, are coupled in parallel relation at regular intervals, corresponding to the links of the chains, by means of transverse shafts 7, (see Figs. III, and IV), which support the rollers 6, and also act as pivots for the links 8, which are spaced by suitable disks 9, which are engaged by the notches in the sprocket wheels. In this instance, there is a roller 6, for every two links of the chain, and a disk 9, corresponding to every link, but it is obvious that these numbers may vary according to convenience and usage. The said rollers 6, are mounted to rotate freely upon the shafts 7, between the collars 10, 10, which are secured to the said shafts by means of pins 11, directly adjacent to the chains 5. Motion is imparted to the said chains 5, by the sprocket 22, on shaft 32, which extends beyond the side frames and is journaled at its outer end, in a bearing 40, mounted upon a suitable pedestal, 41. A sprocket wheel 42, is secured to shaft 32, and is driven by means of the chain 43, from the sprocket pinion 44, which is secured to a sleeve 45, on shaft 46, which is also mounted in bearings 47, 47, on pedestals 48, 48. The sleeve 45, is adapted to rotate freely upon the shaft 46, and also carries a sprocket 50, which is driven by the chain 51, from a sprocket pinion 52, secured to a shaft 53, which is journaled in bearings 55, on pedestals 56, similar to the shaft 46. The said shaft 53, receives its power from a sprocket 57, and chain 58, which is driven by a suitable motor not shown in the drawings. The chains and gearing thus described are especially adapted to sufficiently reduce the speed of the conveyer chains. And by the further sprocket gearing shown and to be described, an absolutely fixed ratio of speed is maintained as between the motion of the conveyer chains on the one hand, and the rate at which the sheets are fed to and withdrawn from the machine.

The machine illustrated in the drawings, is designed to accommodate the simultaneous drying of two sheets 60, 61, of moist material which are fed from a drum 62, on a shaft 63, journaled on the machine 64. These sheets 60, and 61, after passing over an idle drum 65, also mounted in the machine 64, extend upward and after passing between the squeeze rollers 70, are fed to the drier. The said squeeze rolls 70, are mounted in suitable brackets 72, which depend from the upper beams 73, of the frames 1, and are adjustable by means of a hand wheel 75. Motion is imparted to the squeeze rolls, by means of a chain 76, which receives its power from a sprocket 77, secured on the outer end of shaft 63, of the machine 64, and transmits it to a sprocket pinion 78, secured on the outer shaft upon which the lower squeeze roller 70, is mounted.

A tension shoe 80, under the influence of compression springs 81, depends from brackets 82, on the frame of the machine, into the path of the rollers 6, on the chain 5, in position to avoid contact with the sheets 60, and 61. By reason of the contact between the shoe 80, and rollers 6, a counter clockwise rotation is imparted to the latter. This is in a contrary direction to that of the incoming sheets which are fed by the squeeze rolls 70, 71. This causes the formation of loops 85, in the sheets, as is shown in dotted lines in Fig. II, where it will be seen that the entering sheets drop readily over the free roller 86, of the series, while the roller 87, is under the influence of the tension shoe 80. The speed of the chains 5, is so related to the rate of motion of the incoming sheets that loops of a predetermined and uniform length are formed as indicated at 88, in Fig. II.

After leaving the tension shoe 80, the rollers 6, are engaged from beneath by carrier rails 90, which are supported by brackets 91, which depend from the upper beams 73, of the side frames 1. By this means the rollers 6, are revolved slowly and uniformly in a clockwise direction whereby the entire sheets are caused to constantly, but slowly advance lengthwise, thus preventing the formation of accumulations of the moist and semi-liquid coating material, at the return bends at the lower ends of the loops 88.

After passing the full length of the machine, the sheets 60, and 61, are withdrawn therefrom, by means of progressing rollers mounted on frames 100, and 120, which are conveniently placed at different levels or floors. The sheet 60, is received on the upper floor between rolls 101, which are in geared relation with each other, by means of pinions 102, driven by a gear wheel 103, on a shaft 105, which carries at its outer end, a sprocket 106, which receives its power by means of a chain 107, from a sprocket pinion 108, mounted upon the shaft 46. The said shaft also carries another sprocket pinion 111, which through a chain 112, transmits its motion to a sprocket wheel 113, which drives the receiving rolls 115, for the webs 61, on the lower floor. The sprocket pinion 130, secured to the shaft receives its motion from a similar pinion 131, on a sleeve 132, on shaft 53. The said sleeve 132, rotates freely upon its shaft and also carries a second sprocket pinion 135, which by means of a chain 136, is geared to the same motor which furnishes the power for the chain 58, hereinbefore described.

After leaving the receiving rolls, the dried sheets may be wound upon reels or stored in any convenient manner ready for shipment.

It will be noted that in the operation of

the machine which I have thus described, the folds of the sheet which are formed initially between successive rollers as they pass forward over the sprocket wheels 20, do not remain while drying in fixed relation to the entire sheet, since as soon as the rollers encounter the rail 90, they begin to slowly rotate simultaneously in the same direction, so that the entire web is slowly advanced lengthwise with constant variation of the position of its folds in relation to each other. The rate at which this occurs depends upon the rate at which the rollers are passed through the mechanism, which in turn bears a fixed relation to the rate at which the sheet is fed to the apparatus, a matter which is determined by conditions of manufacture. Therefore, no fixed rule can be given as to the exact speed and time occupied by the sheet, as it passes through the mechanism for drying purposes.

The length of the entire mechanism, will be determined by practical considerations looking to the length of time necessary to adequately dry the sheet. It will, therefore, be understood that the means described for supplying rotation to the parts are merely shown as examples, and that they will vary according to the practical conditions of manufacture to which the mechanism is subjected.

Having thus described my invention, I claim:—

1. In a drying mechanism, the combination of parallel endless chains; means for continuously progressing said chains; an endless series of rollers rotatably journaled between said endless chains; and means for imparting individual rotation to said rollers as they are advanced by the motion of the endless chains within which they are carried.

2. In a drying mechanism, the combination of progressing parallel endless chains; an endless series of rollers carried by said chains and rotatably journaled therebetween; means for feeding a moist sheet in such relation of speed to the rate of progression of the rollers as to festoon the sheet between the rollers; and means for slowly rotating the rollers as they carry the festooned sheet.

3. In a drying mechanism, the combination of parallel endless chains; a series of rollers rotatably journaled between said endless chains; means for continuously advancing said series of rollers; and means for successively imparting to each roller of the series, rotation, first in a direction opposed to that in which the series advances, and subsequently in the direction in which the series advances.

4. In a drying mechanism, parallel endless chains, with means for imparting continuous rotation thereto; rollers carried freely between said endless chains; a friction shoe, in the path of said rollers and engaging them successively to impart rotation to them; a rail mounted in the path of said rollers in immediate sequence to said shoe, and engaging them to impart rotation to them in a direction counter to that imparted to them by the shoe.

5. In a drying mechanism, a pair of parallel endless sprocket chains; shafts connecting the chains at intervals; and rollers freely turning on said shafts between the chains.

6. In drying mechanism, parallel endless sprocket chains carrying a series of rollers between them; sprocket wheels in pairs, by which said chains are carried and their endless progression determined, one of said pairs of sprocket wheels being mounted in adjustable bearings, whereby slack in said sprocket chains may be regulated.

7. In drying mechanism, an endless series of rollers wide enough to carry more than one sheet; means for feeding simultaneously a plurality of sheets side by side to said rollers, and festooning them thereon; and means for removing said sheets and leading them to different levels.

In testimony whereof, I have hereunto signed my name, at Maurer, N. J., this 22nd day of June 1909.

RICHARD HENDERSON.

Witnesses:

R. L. FOWLER,

J. C. FOWLER.