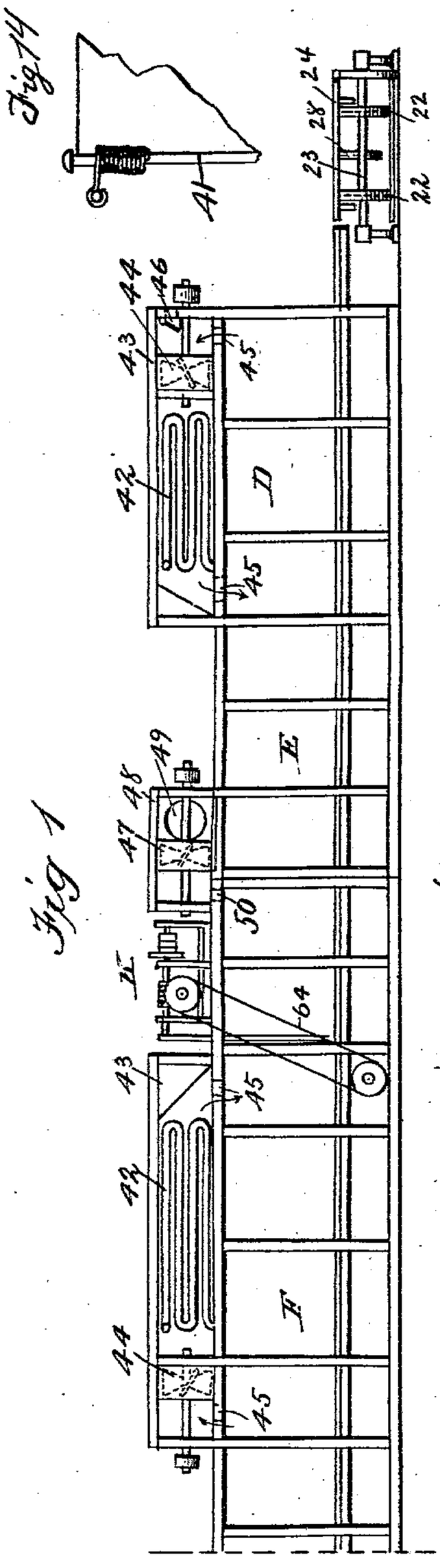
No. 687,033. Patented Nov. 19, 1901.

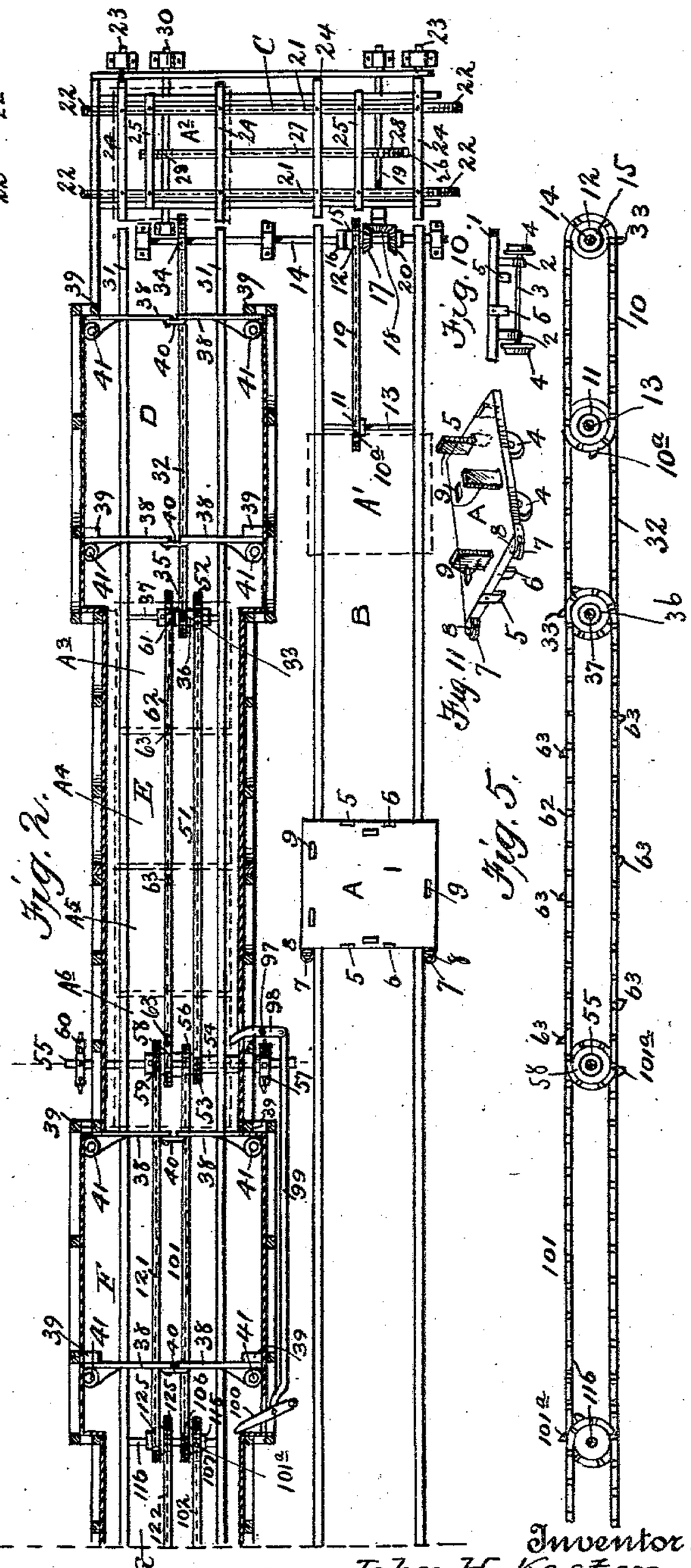
J. H. KESTER.

MACHINE FOR DRYING, COOLING, AND SOFTENING TOBACCO.

(Application filed Oct. 13, 1900.)

(No Model.) 3 Sheets—Sheet 1.





Witnesses
Franck L. Durand.
F. G. Radelfinger.

Inventor:
John H. Kester.
By Lacy Lagger & Co.,
Attorneys.

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(No Model.) 3 Sheets—Sheet 2.

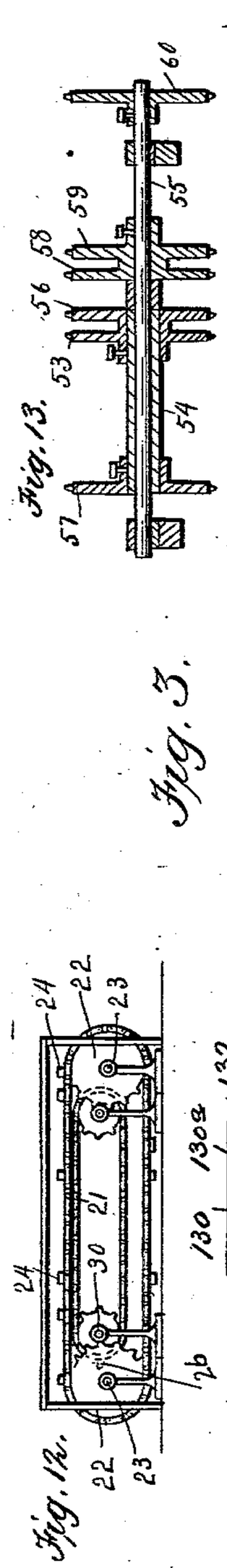

Fig. 12.

Fig. 13.

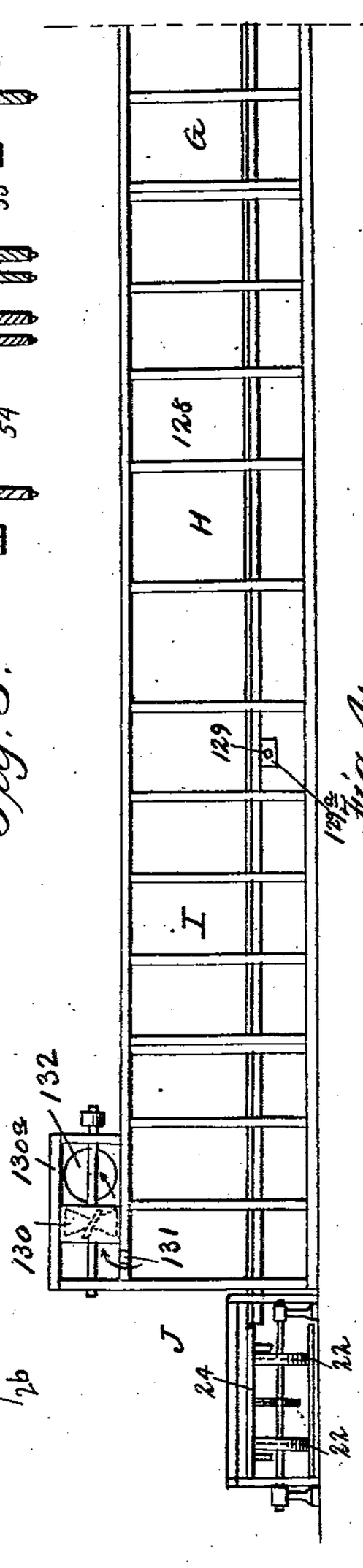

Fig. 3.

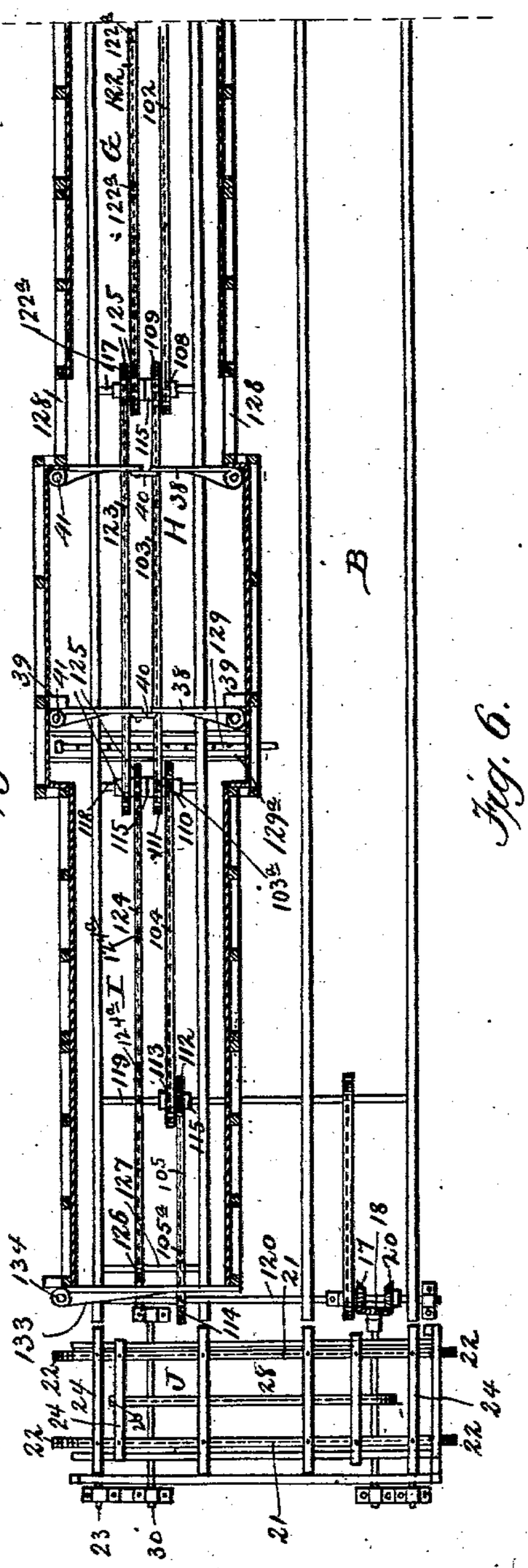

Fig. 4.

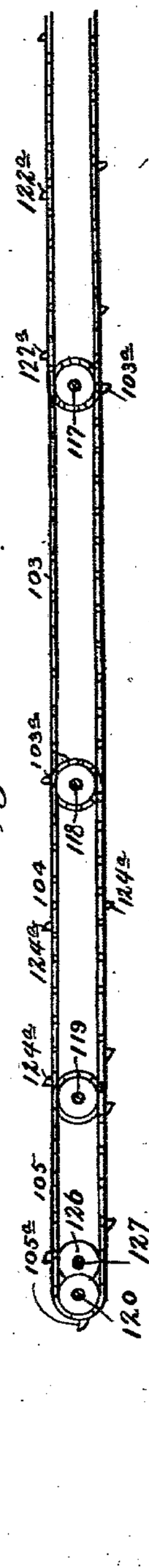

Fig. 6.

Witnesses
Franck L. Durand.
F. G. Radelfinger.

Inventor:
John H. Kester.
By Louis Bagger & Co.
Attorneys.

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Fig. 7.

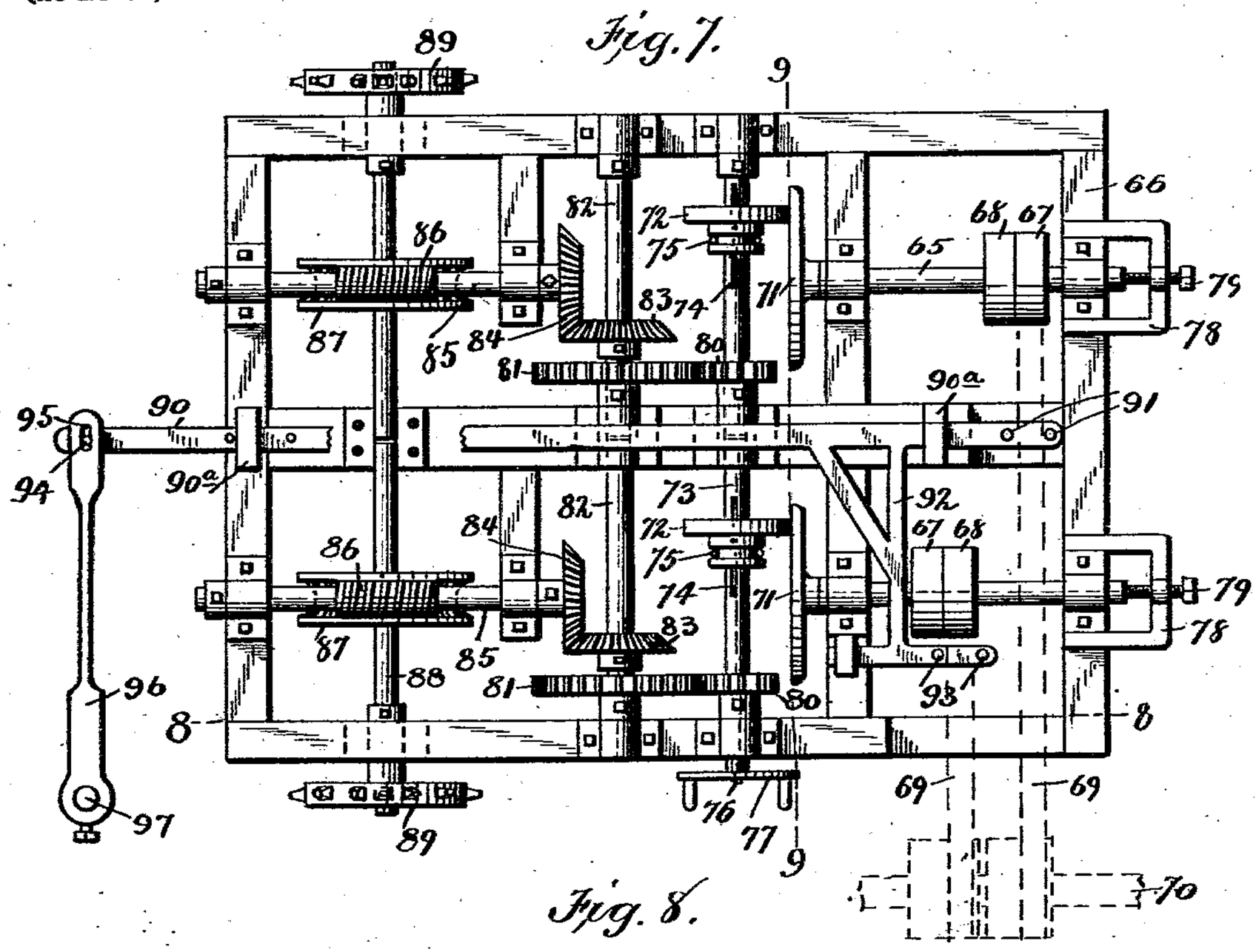


Fig. 8.

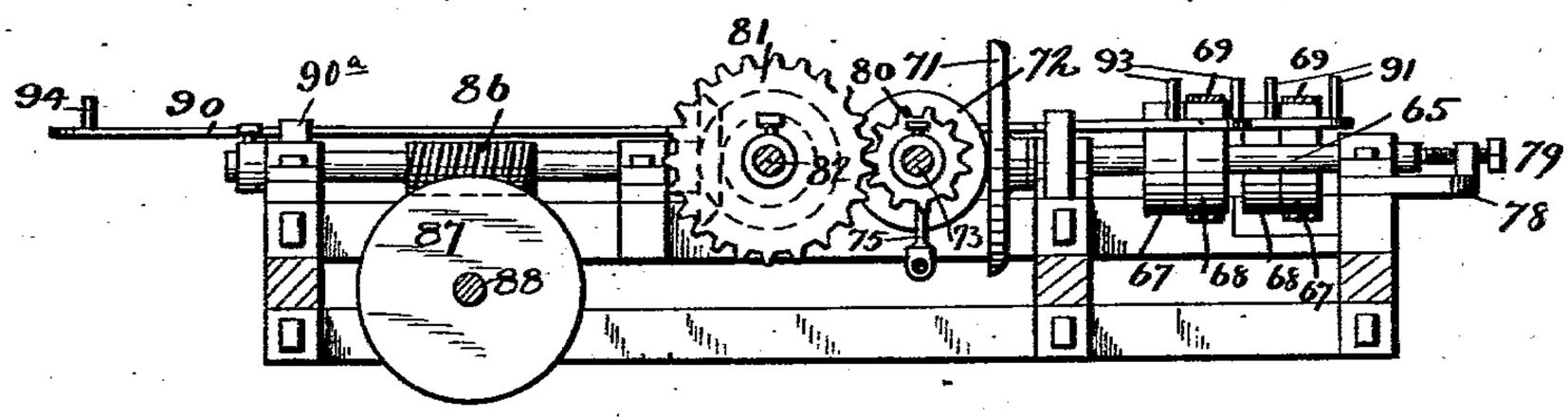
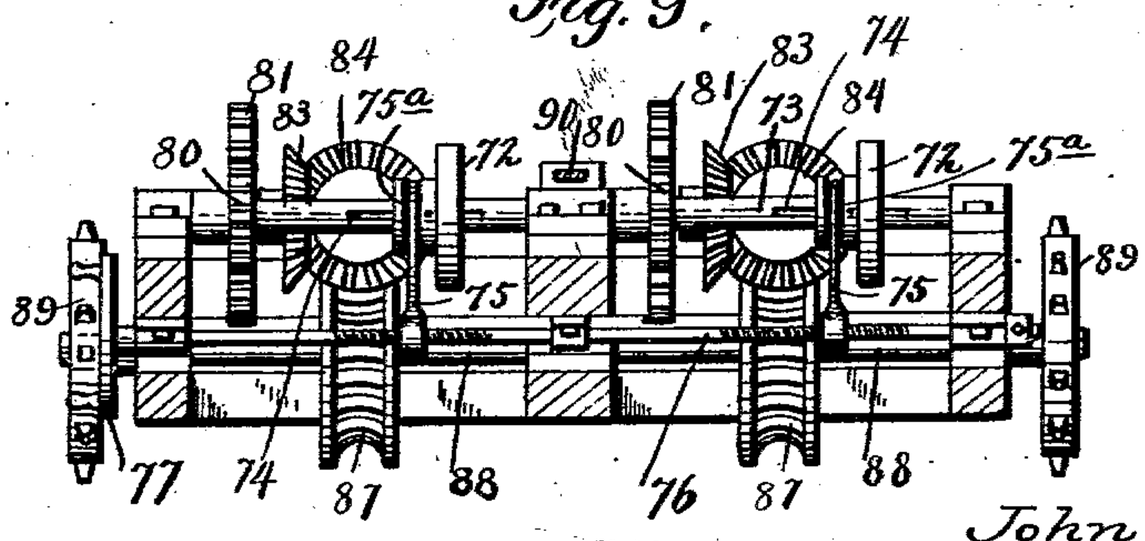


Fig. 9.



Witnesses
F. L. Ourand.
F. G. Radelfinger.

Inventor:
John H. Kester.
By Louis Bagger & Co.,
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN H. KESTER, OF WINSTON, NORTH CAROLINA.

MACHINE FOR DRYING, COOLING, AND SOFTENING TOBACCO.

SPECIFICATION forming part of Letters Patent No. 687,033, dated November 19, 1901.

Application filed October 13, 1900. Serial No. 32,992. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. KESTER, a citizen of the United States, residing at Winston, in the county of Forsyth and State of North Carolina, have invented new and useful Improvements in Machines for Drying, Cooling, and Softening Tobacco, of which the following is a specification.

My invention relates to tobacco-driers, or, more specifically, to a combined tobacco drier, cooler, and softening machine. The advantages of my drier are the tobacco is treated while loaded on cars and the cars are automatically carried successively into and through the drying, cooling, and softening rooms after being once presented to the machine—that is, after the drying-room has been once filled with cars the whole operation is automatic. Empty cars may be used in starting it, or it may be operated by hand until the first batch of cars have been carried through the drying-room, all of which will appear.

The novel construction designed by me in carrying out my invention is fully described in this specification and claimed, and illustrated in the accompanying drawings, forming a part thereof, in which—

Figure 1 is a side elevation of the drying-room and its accessories. Fig. 2 is a longitudinal horizontal section of the same. Fig. 3 is a side elevation of the cooling and softening rooms. Fig. 4 is a horizontal longitudinal section of the same. Fig. 5 is a side elevation of the carrier-chains of the drying-room. Fig. 6 is a side elevation of the carrier-chains of the cooling and softening rooms. Fig. 7 is a plan view of the motor. Fig. 8 is a section on the line 8 8, Fig. 7. Fig. 9 is a section on the line 9 9, Fig. 7. Fig. 10 is a rear elevation of one of the cars. Fig. 11 is a perspective of one of the cars. Fig. 12 is a side elevation of the carriage. Fig. 13 is a longitudinal section of the driving-shaft on the line 13 13, Fig. 2. Fig. 14 is a fragmentary detail of one of the shafts 41 with the coiled spring mounted thereon.

Like characters of reference designate like parts in the different views of the drawings.

To facilitate the understanding of the construction and operation of my machine, each principal part will be designated by a capital letter, the letters progressing alphabetically in the order in which the different parts come into use. The letter A designates the car or one of the cars on which the tobacco is loaded. The cars start on a track B, which is external to my machine, but may still be under cover, as under a shed. From the end of the yard-track B the car is automatically run onto a carriage C, from whence it is automatically brought to the outer door of a vestibule D of the drier. The car is next carried through the vestibule, traversing *en route* two pairs of swinging doors. This brings it into the drying-room E, which it traverses in four stages, after which it makes its exit through a pair of swinging doors and enters a second vestibule F. A second pair of swinging doors are then passed through, when the cooling-room G is reached, which is traversed in the same manner as the drying-room in four stages. The exit from the cooler G is made through a pair of swinging doors and a third vestibule H entered. Then another pair of doors must be passed through to gain access to the softening-room I, which room is traversed in four stages, when a last door is opened and the car placed on a carriage J. This carriage J then returns the car to the track B, from whence it started. The tobacco has then been automatically carried through the process of drying, cooling, and softening, the treatment is completed, and the car may be sidetracked and unloaded.

The description of the detail parts will now be given, special stress being laid on the automatic features of the device.

Each of the cars A has a bed 1, provided with hangers 2, supporting axles 3, bearing flanged wheels 4. The under side of the bed has mounted thereon two pairs of arms 5 and 6, which are located to be engaged by lugs on the carrier or driving chains. One set of arms are engaged by the lugs on one set of chains and the other by the other set of chains, as will be fully set forth. Horizontal wheels 7 are supported in frames 8, secured one to each side of the car. These wheels form roller-bearings, which interpose between the car and the various doors which the car bumps open in its course through the machine. A set of standards 9 are fitted in the top of the car A to serve to retain the crates of tobacco thereon.

The track B is of ordinary construction, consisting of two parallel rails. A carrier-chain 10, provided with a lug 10^a, is located at the right-hand end of the track B and runs over sprocket-wheels 11 and 12, mounted on shafts 13 and 14, respectively. The shaft 13 is short, and the sprocket 11 is keyed thereon, while the shaft 14 is longer and extends the width of the machine. The sprocket-wheel 12 is keyed to a sleeve 15, which is loosely mounted on the shaft 14 and has its longitudinal movement prevented by a collar 16, rigid on the shaft. A bevel-gear 17 is formed integral with the outer end of the sleeve 15 and meshes with a like gear 18, keyed on a shaft 19, extending across the carriage C. A third gear 20 meshes with the gear 18, is keyed on the shaft 14, and serves to drive the gears 18 17, sprocket 12, and thereby chain 10. The lug 10^a engages the rear one of the arms 5, and thus drives the car.

The carriage or carrier C comprises a pair of parallel chains 21, passing over sprocket-wheels 22, which are keyed on shafts 23. These chains 21 have mounted transversely thereof eight rails 24, forming four tracks. Four strips 25 are also secured to the said chains 21 and are positioned to be engaged by a lug 26, formed on a chain 27, which runs on sprockets 28 and 29, keyed on shafts 19 and 30, respectively. The lugs 10^a and 26 are so located relative to one another that when a car is brought up by the chain 10 the lug 26 stands ready to engage one of the cross-pieces 25 to actuate the carriage and transport the car to the other end. The passing of the lug 26 around the sprocket-wheel 29 will cause it to release the strip 25 and stop the carriage. The rails 24 are so located relative to the lug 26 and the track B that one pair of them line up with the track B whenever the carriage C stops. The connection between the gears 18 and 20 provides means for driving this carriage. When the car reaches the other end of the carriage, the tracks 24 are in line with a third track formed by rails 31, extending the whole length of the machine.

A carrier-chain 32, provided with two lugs 33 and meshing with two sprocket-wheels 34 and 35, is provided to carry the car into and through the vestibule D. The sprocket 34 is keyed on the shaft 14, and the sprocket 35 is formed integral with a sleeve 36, loosely mounted on a shaft 37. When the car is on the end of the carriage, the arm 5 will be in position to be engaged by the lugs 33 as they pass around, and the car thereby hauled into the vestibule D. The vestibule D consists of a chamber housed in at both sides and the top and provided with swinging doors 38. These swinging doors 38 are hung to swing in the direction of the travel of the cars, uprights 39 being provided to prevent their outward movement. A batten 40 is secured to the inner side of one of the doors to prevent the admission of cold air and to prevent them passing each other. Spiral springs (not shown) surround the vertical shafts 41, on which the doors are mounted, and serve to restore the doors to their normal position after being displaced. When the car A comes up to the doors 38, the rollers 7 contact with the doors and the doors opened, the rollers enabling the doors to be gradually forced aside without being injured. After the car has passed through, the doors are restored to their normal position of closed, by the action of the before-mentioned springs. The shaft 37 is located beyond the vestibule D inside the drying-room E. By this arrangement the car is carried through the vestibule and through a second pair of swinging doors 38 by means of the chain 32. The second pair of swinging doors are identical in construction and operation with the first pair. They are accordingly designated by the same numerals of reference, as will be all other pairs of swinging doors in the machine. The interposing of the vestibule D between the open air and the drying-room is a very important feature of my device, as the influx of a large quantity of cold air is thereby prohibited.

The drying-room E will next be described. This room is made very tight and is heated and ventilated by means of two coils and three fans. The coils are designated by the numeral 42 and are located on the top of the machine adjacent to the ends of the drier E. Steam is supplied to the coils 42 from some external source, such as a steam-boiler, and they are covered by means of housings 43. Fans 44 are located one adjacent to each coil, and openings 45 enable them to keep up a circulation of air. A flap-valve 46 is placed over an opening in the end of the right-hand housing 43 and a shortage of air thereby guarded against. Under normal conditions this flap would be held closed by the force of the blast of the fans; but a diminution of pressure caused by an insufficient supply of air would cause it to open, and thus permit the inflow of air. The other fan requires no valve, as it communicates with the cooler G. A third fan 47 is located in a housing 48, built on the roof. This housing has openings 49 and 50 therein, which permit the fan 47 to withdraw the moist air which accumulates in the top of the drier.

The means for hauling the cars through the drier will next be described.

A driving-chain 51, unprovided with lugs, and which meshes with sprockets 52 and 53, drives the sleeve 36, hereinbefore described. The sprocket 52 is keyed on or formed integral with this sleeve 36, and therefore revolves in unison with the sprocket 35. The sprocket 53 is keyed on a sleeve 54, which is mounted to revolve on an axle consisting of a shaft 55. The sleeve 54 also carries two more sprockets 56 and 57, both rigidly keyed thereon. The shaft 55 has keyed thereon three sprockets, (designated by the numerals 58, 59, and 60.)

The sprocket 58 acts, in combination with a sprocket 61, keyed on the shaft 37, to drive a carrier-chain 62. This chain 62 is provided with seven lugs 63 and is designed to intermittently move the cars to advance them in four stages on their journey through the drier. With this object in view the sprockets 57 and 60 are connected by chains 64 to a motor K, located on the roof of the drier.

The motor K (see Figs. 7, 8, and 9) is constructed to operate the sprockets 57 and 60 alternately and is shifted from one to the other by means of levers operated by the cars on the track. With this end in view the motor has two shafts 65 journaled in the framework 66. Each of these shafts has mounted thereon a tight pulley 67 and a loose pulley 68. Belts 69 connect these pulleys to a main driving-shaft 70. (Shown in fragment only.) This shaft 70 is designed to extend the whole length of the machine parallel to the track and to be a source of power for driving all the fans of the machine, which are to be connected thereto by belts. Keyed to the inner ends of each shaft 65 are friction-disks 71, which bear against friction-pulleys 72. The pulleys 72 are mounted on shafts 73 and are constrained to revolve with them by keys seated in slots 74. The slots 74 permit longitudinal displacement, and thus enable the speed of the combination to be adjusted. This adjustment is accomplished by means of spanners 75, fitting grooves 75^a in the pulleys 72, which spanners are pierced by internally-threaded apertures fitting on a threaded rod 76, extending transversely the frame. A crank 77 is keyed on the end of said rod and enables it to be easily turned and the adjustment accomplished. The pressure of the disk 71 is also adjustable. For this purpose yokes 78, having screws 79 seated therein, are provided. By operating the screws 79 the shafts 65 can be moved endwise and the adjustment for pressure made.

The shafts 73 carry gears 80, which mesh with gears 81, keyed on shafts 82. Bevel-gears 83 are also keyed on shafts 82, and these mesh with bevel-gears 84, mounted on shafts 85. The shafts 85 also carry gears 86, which in turn mesh with gears 87, keyed on shafts 88. Sprockets 89 are keyed to the outer ends of the shafts 88, and these sprockets mesh with the chains 64, and connection with the car-propelling mechanism established. To move the belts 69 from the tight to the loose pulleys, and vice versa, a shifter is provided. This shifter consists of a bar 90, mounted to slide longitudinally in guides 90^a. A pair of pins 91 are seated in the inner end of the bar 90, one being located on each side of the belt. An arm 92 is formed integral with the bar 90 and is fitted with a second pair of pins 93, which embrace the other belt 69. These belts 69 are so arranged that when one is running on the tight pulley the other is on the loose one. This permits the two sides of the motor to be operated independently. The outer end of the bar 90 bears a pin 94, which engages a slot 95, formed in an arm 96. The arm 96 is keyed on a shaft 97, which extends down and forms the fulcrum of a lever 98, keyed thereon. This lever 98 is pivotally joined at its outer end to a connecting-rod 99, which rod is oppositely connected to a lever 100, fulcrumed at its outer end. The levers 98 and 100 extend through slots in the housing of the machine and into the path of the cars A as they pass along the track. By this arrangement one of the belts 69 is shifted from the tight to the loose pulley and the other from the loose to the tight pulley every time one of the levers 98 or 100 contacts with a car. These levers are so located that this will occur alternately.

The mechanism for carrying the cars through the remainder of the machine will now be taken up. This mechanism is very similar to that already described. The carrier-chains are arranged in two parallel series, one series running on sprockets keyed on sleeves loosely mounted on shafts, while the other series consists of chains running on sprockets keyed directly on the shafts on which the sleeves are mounted. The chains of each series are alternately blank and lug-bearing, so there is one chain in each series for pulling the car along.

The chains of the first series are designated by the numerals 101 to 105, inclusive. The chain 101 bears two lugs 101^a, the chain 102 no lugs, chain 103 two lugs 103^a, chain 104 no lugs, and the chain 105 bears one lug 105^a. The sprockets are numbered from 106 to 114, inclusive, and with the exception of the sprocket 114 are mounted in pairs on sleeves, (designated by the numeral 115.) The shafts are denoted by numerals 116 to 119, inclusive. The sprocket 114 is rigidly keyed on a shaft 120, which extends across the machine.

The second line of driving-chains will now be described. These chains are designated by numerals 121 to 124, inclusive. The chains 121 and 123 are blank—that is, bear no lugs—while the chains 122 and 124 bear seven lugs apiece, (designated by the characters 122^a and 124^a.) These chains are each designed to transport the car through a distance of their length in four stages. The sprockets on which these chains run are each denoted by the numeral 125, with the exception of the outermost one, which is numbered 126 and is keyed on a shaft 127. As before mentioned, the sprockets 125 are keyed on the shafts which are numbered from 116 to 118, inclusive. The sprocket 126 is located inside the softener I, so that the chain will release the car while in the room, and the chain 105 will draw it through the door.

The vestibules F and G are identical in construction with the vestibule D already described and will therefore be dismissed with this remark. The cooler, into which the car passes after traversing the vestibule F, is equal in length to the drier, and the cars re-

main in it the same length of time. It is entirely covered in with the exception of one panel 128, which is left open. The opening 45, leading into the left-hand fan 44, previously described, connects directly with the cooler, and this causes a flow of cool air from the opening 128 to the opening 45 and into the drier.

The softening-room I, which is entered after passing through the vestibule H, is closed tight and supplied with vapor in the form of steam by means of a perforated steam-pipe 129. This pipe is inclosed in a box 129^a, open at the top, which box is located below the level of the track. A fan 130, which is covered by a housing 130^a, is located on the roof of the softener. Openings 131 and 132 are made in this housing, one to establish communication with the softening-room and the other with the open air. By this arrangement ventilation of the softening-room is secured. The softener I has a capacity of four cars and is traversed in the same time as the drier E.

The exit end of the softening-room is closed by means of an outwardly-swinging door 133, which is fitted with a vertical axis 134 and a spiral spring. (Not shown.) By this arrangement the door can be forced open by the cars and will be restored to its normal position of closed by the spring.

The carriage J is identical in construction and operation with the carriage C, and like parts are denoted by like characters of reference.

The description of the operation of my machine will now be completed by describing the operation of such parts as were omitted in the introduction. We will suppose the drying-room E filled with cars—that is, four cars. These cars are represented by dotted rectangles, (designated A^3, A^4, A^5, and A^6.) We will also suppose a car on the end of the carriage C and one on the track B, adjacent to the carrier-belt 10. These latter cars are represented by dotted rectangles A^2 and A', respectively. It will now be assumed that the car A^6 is given a push, which will cause it to go forward and contact with the lever 98. This action will operate the shifting-bar 90 on the motor K and throw in the mechanism which runs the chain 101. One of the lugs 101^a will engage the forward arm 6 on the car and haul the car through the vestibule F and into the cooling-room G. The same agency which drives the chain 101 will also actuate the chain 32, which will revolve the shaft 14 and run the chains 10, 27, and 32. This will cause the lugs on chains 10 and 32 to engage and haul the cars A' and A^2, respectively. The car A' will run onto the carriage C, and by that time the lug 26 on the chain 27 will have traveled around into position to engage one of the cross-pieces 25 and will actuate the carriage and transport A' into the initial position of A^2. The car A^2 will in the meantime be pulled by the chain 32 through the vestibule D and part way into the drier E. By the time this is accomplished the car A^6 will have reached a point opposite the lever 100, will contact therewith, and stop the belts 101, 32, and 10. The other side of the motor will be simultaneously brought into operation through the medium of the rod 99, shaft 97, bar 90, and belt 69. The chain 62 will then be driven and the cars A^5, A^4, and A^3 advanced into the former position of A^6 A^5 A^4 or a little in advance of them and the car A^2 brought into the old position of A^3. The car A^5 is advanced by the action of the belt 62 far enough to engage the lever 98, and thereby throw the other line of chains into operation. It will be observed from the foregoing description that the two series of chains are thrown into action alternately, that the drier is traversed in four stages, and since the cooling and softening rooms are of the same length as the drier and are fitted with the same kind of chains these will be traversed in four stages and in the same time.

I do not wish to be limited as to details of construction, as these may be modified in many particulars without departing from the spirit of my invention. The capacity of the drier, cooler, and softener may each and all be varied without material modification of the other mechanism.

Having described my invention, what I claim as new, and wish to secure by Letters Patent, is—

1. In a tobacco-treating machine, the combination, of a drying-room, a cooling-room, a softening-room, said rooms being arranged so that tobacco may be carried from one to the other without passing into the open air, a track traversing said rooms, a track exterior to said rooms, cars running on said tracks, a transfer device for carrying cars from said exterior track to the said track traversing said rooms, and intermittently-operated means for operating said transfer device and for actuating said cars, substantially as described.

2. In a tobacco drier, cooler and softener, the combination, substantially as described, of a drying-room, a cooling-room, a softening-room, a track traversing all three of said rooms, and means for automatically transferring cars constructed to run on said track, from said drying-room into said cooling-room and from said cooling-room to said softening-room.

3. In a tobacco drier, cooler and softener, the combination substantially as described, of a first vestibule, a drying-room connected to said first vestibule, a cooling-room, a second vestibule connected to said drying-room and said cooling-room, a softening-room, a third vestibule connected to said cooling-room, said rooms being arranged so that tobacco may be transported in succession from the first vestibule through the said drying-room, through the said second vestibule,

through the said cooling-room, through the said third vestibule, and through the said softening-room.

4. In a tobacco drier, cooler and softener, the combination, substantially as described, of a drying-room, a cooling-room, a softening-room, and means for automatically transporting tobacco from the open air into and through the said drying-room, then into and through the said cooling-room, then into and through the said softening-room and finally into the open air, said automatic means being intermittent in operation.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN H. KESTER.

Witnesses:
BENNETT S. JONES,
FRANK G. RADELFINGER.