

No. 693,387.

Patented Feb. 18, 1902.

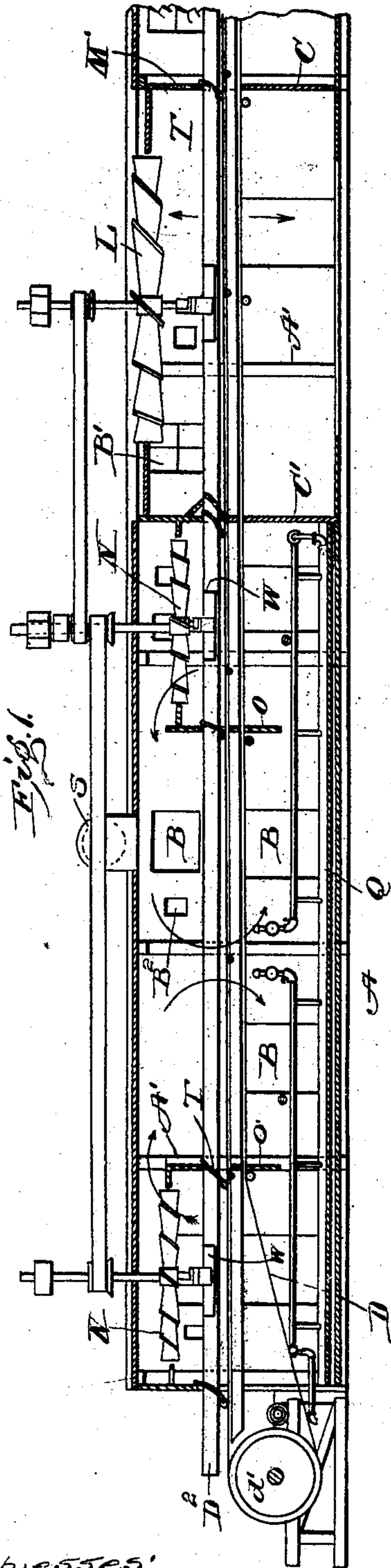
J. D. GOODWIN.

TOBACCO DRYING, COOLING, AND ORDERING MACHINE.

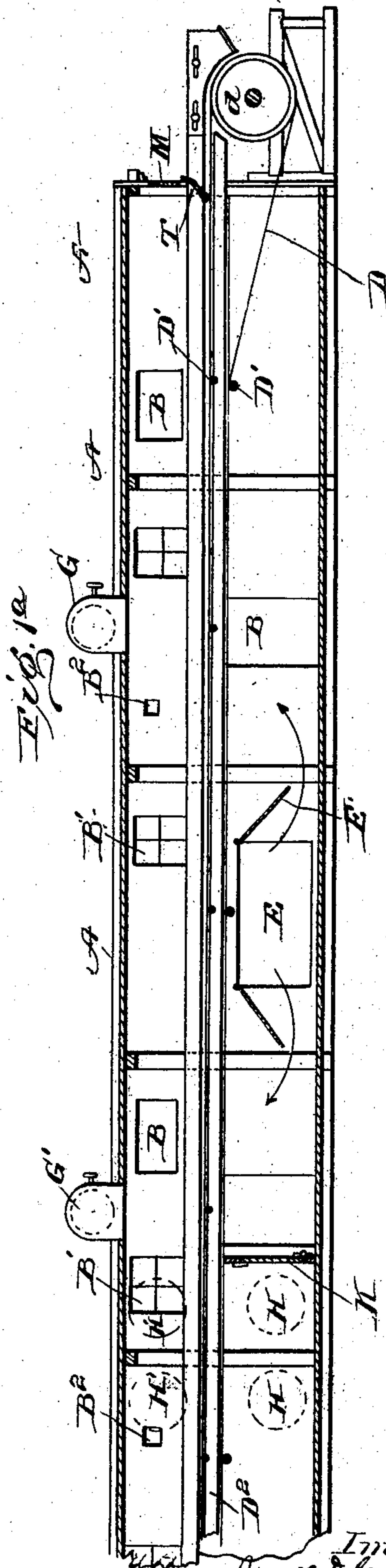
(Application filed June 15, 1901.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
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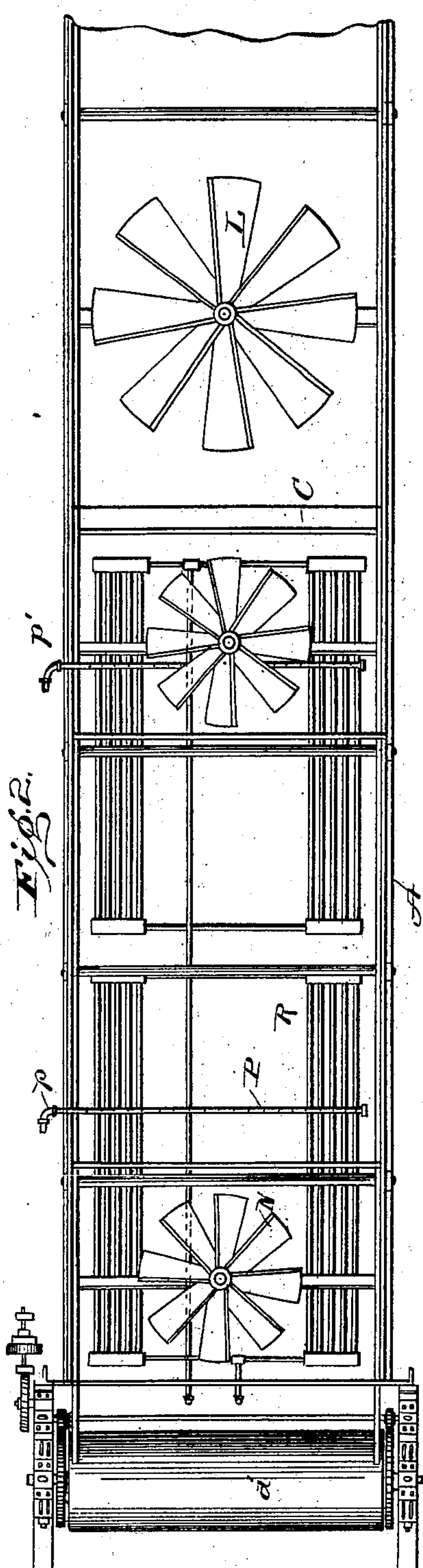
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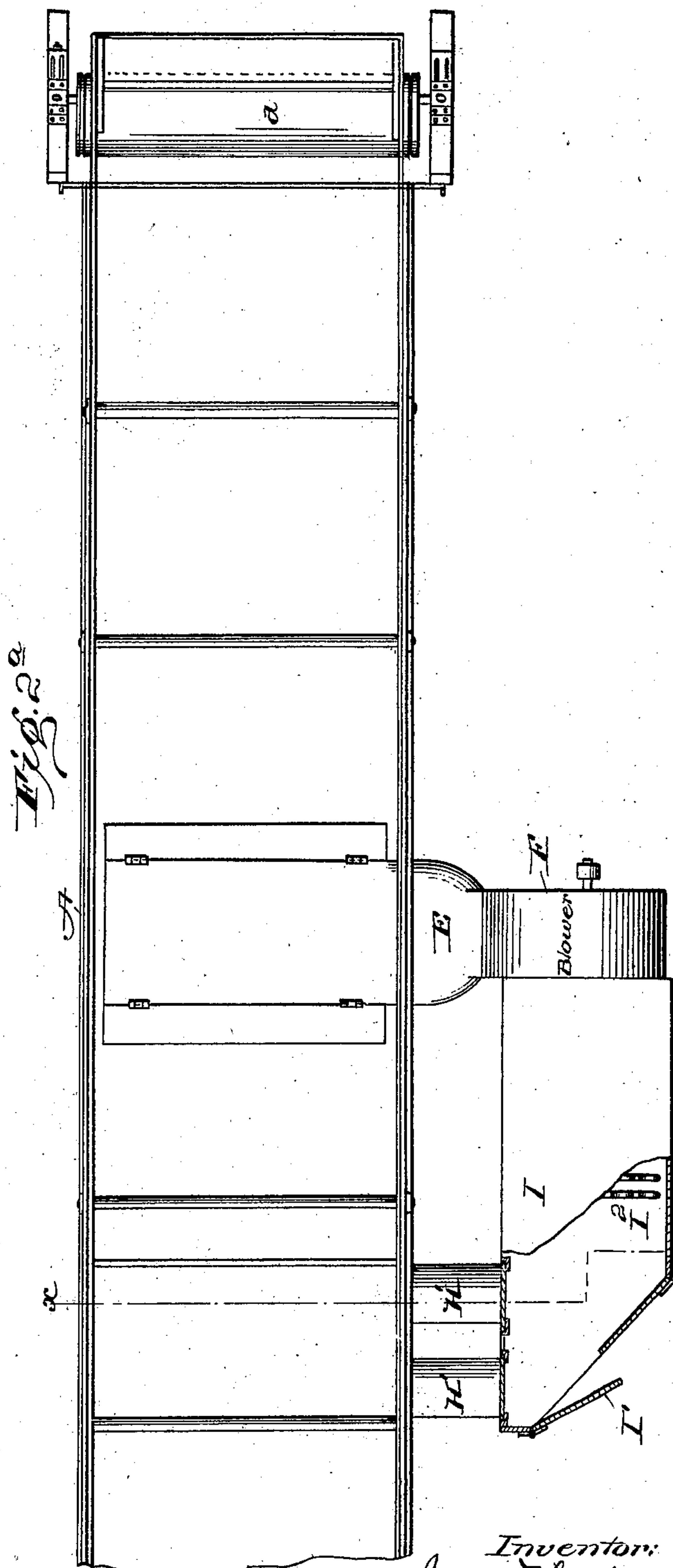
(No Model.)

3 Sheets—Sheet 2.



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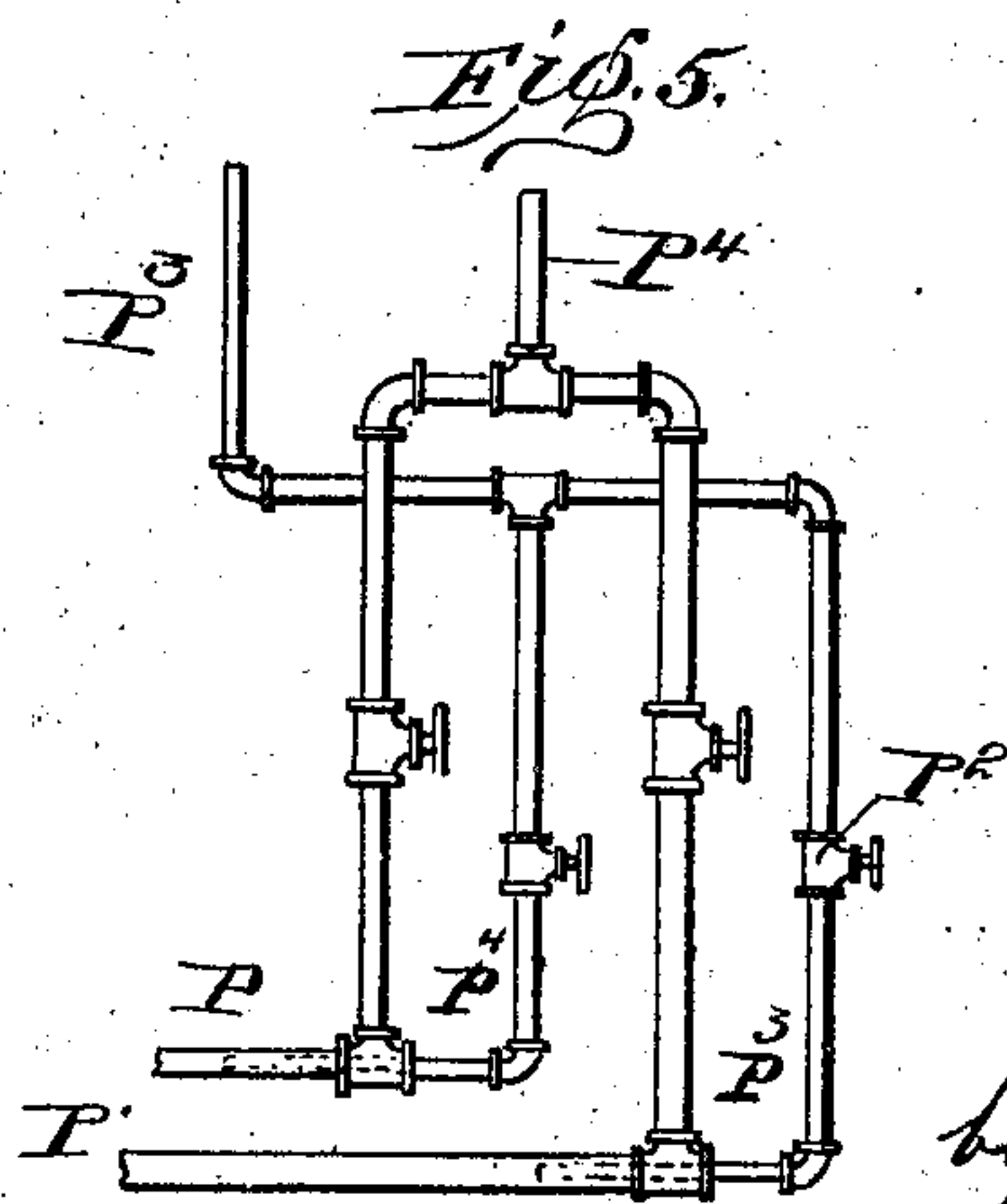
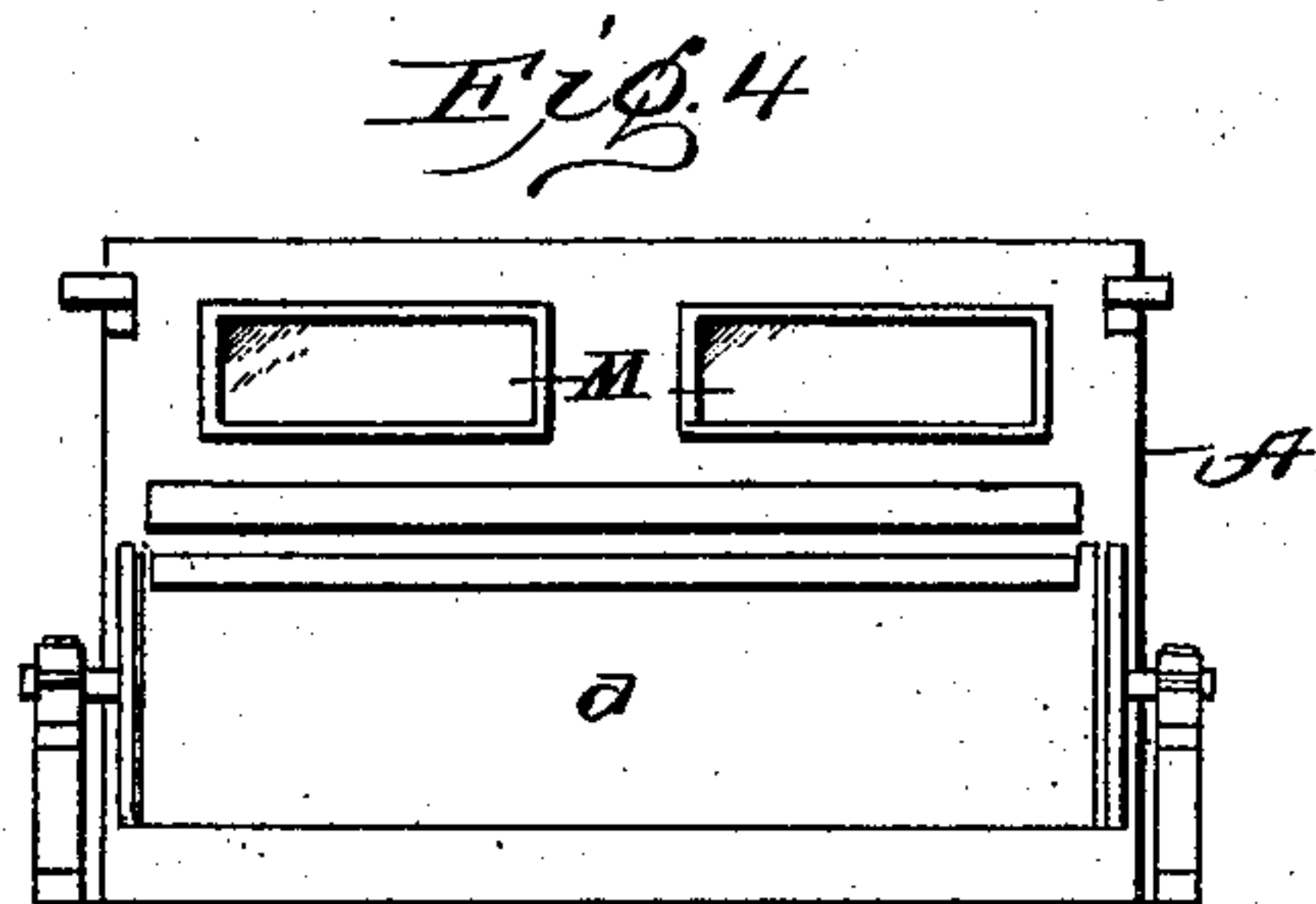
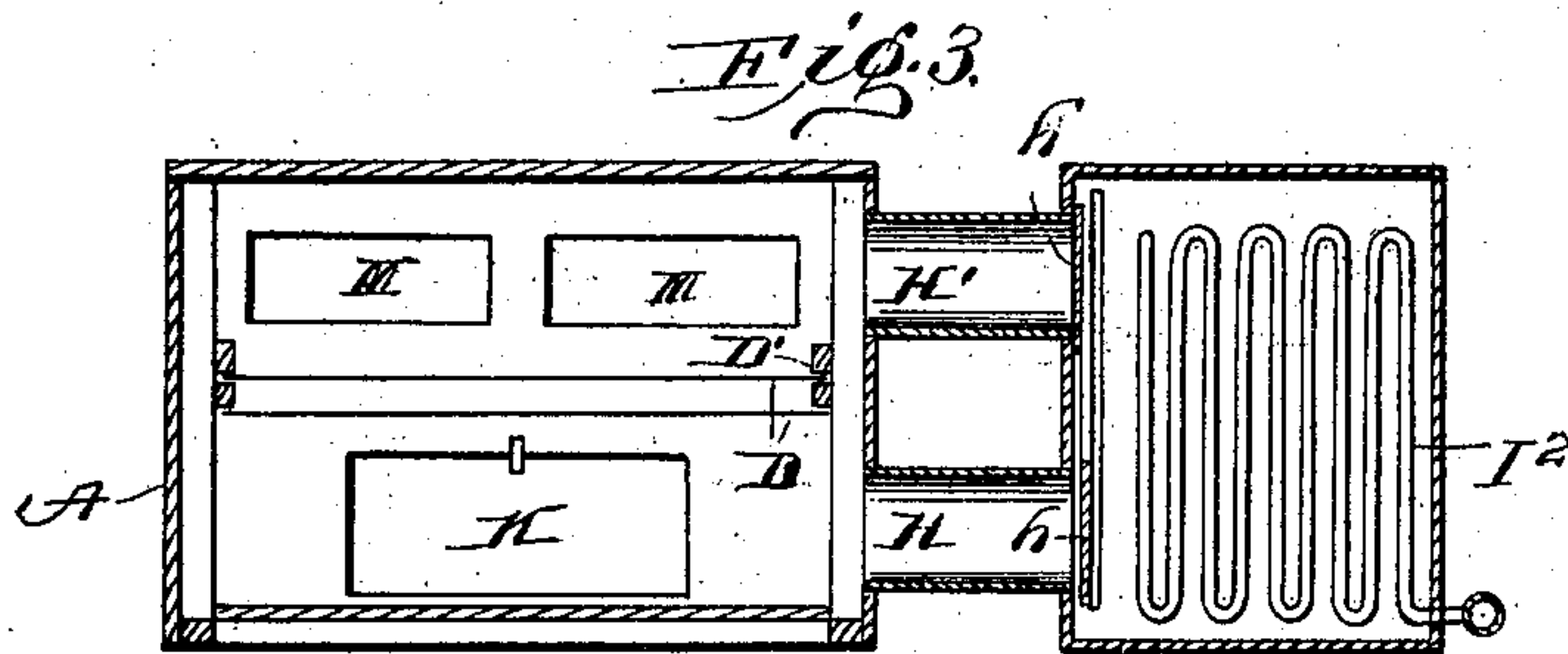
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(Application filed June 15, 1901.)

(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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TOBACCO DRYING, COOLING, AND ORDERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 693,387, dated February 18, 1902.

Application filed June 15, 1901. Serial No. 64,732. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. GOODWIN, of Richmond, in the county of Henrico, State of Virginia, have invented certain new and useful Improvements in Tobacco Drying, Cooling, and Ordering Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in that class of machinery employed in the preparation of tobacco preliminary to the processes of manufacture or prior to being packed and stored for future utilization.

Tobacco prior to being packed for storage or preliminary to the various processes of manufacture should be reduced to a uniform moist and warm condition, and the machines for accomplishing these ends are known as "drying" and "ordering" machines.

The present invention has for its object the production of a machine which will accomplish the desired ends more expeditiously and thoroughly than accomplished by prior machines and with the expenditure of less power, both for motive work and for the work of heating and moistening, than has heretofore been found necessary.

A further object of the invention is to provide a machine adapted to work at a maximum efficiency regardless of the particular temperature or humidity of the atmosphere existing at the time.

Referring to the accompanying drawings, Figures 1 and 1^a are sectional elevations of the two ends of a drying, cooling, and ordering machine embodying the present improvements. Figs. 2 and 2^a are top plan views of the machine illustrated in Figs. 1 and 1^a with the top of the casing and conveyer removed. Fig. 3 is a section on the line *x x*, Fig. 2^a. Fig. 4 is an end elevation looking at the entrance or right-hand end, Fig. 1^a. Fig. 5 is a detail elevation of the feed-piece for the atomizing mechanism.

Like letters of reference in the several figures indicate the same parts.

The body of the machine is formed by a long casing A, preferably substantially rectangular in cross-section and suitably braced at proper intervals by framing, as A'. The walls of the casing are of single thickness—that is to say, without air passages or ducts therein for the circulation of air in the process of drying, cooling, and ordering, and hence may be and are conveniently provided with doors B, windows B', and hand-holes or openings B², through which the tobacco may be inspected and tested and the temperature and humidity observed at any point in the process. The doors and hand-holes may be conveniently employed as vent-apertures or for the admission of fresh air from the exterior in addition to the regular venting and admission apertures, to be hereinafter described.

The casing or body A is divided off into compartments or sections, as in other machines of this type, and such compartments are termed the "drying," "cooling," and "ordering" compartments, the partitions dividing the casing into the compartments mentioned being indicated by the letters C and C'. The tobacco is carried through the several compartments by a continuous conveyer or belt D, which passes over a large roller *d* at the entrance end of the machine and over a corresponding roller *d'* at the discharge end of the machine, the intermediate portions of the belt being supported by small rollers D', suitably journaled in bearings on the side wall of the casing, the bearings being preferably located on the outer side of the casing, as illustrated in Fig. 2 of the drawings, thereby permitting the belt to occupy the full width of the casing, and said rollers are so arranged that the belt will bear on each of them with a substantially uniform pressure, whereby said rollers are caused to turn or rotate and prevent friction against the body of the belt in order to prevent, so far as possible, any wear of the strands constituting the belt. The uniform pressure referred to is preferably obtained by causing the belt to travel in a crowning or curved path, as will be seen from an inspection of Figs. 1 and 1^a, where the rollers located at the central portion of

the casing are somewhat higher than those at each end. If desired, said belt may be further guided by side strips D² in order to prevent the tobacco from working in between the edges of the belt and side walls of the casing.

The belt or conveyer D is of foraminous material, preferably wire-netting, and in the various steps of the process air is caused to travel through said belt and the tobacco carried thereby in each direction. Thus in the drying-compartment, which is the first compartment the tobacco enters and illustrated in Fig. 1^a, air is forced in through the duct E from a blower F, Fig. 2^a, and is discharged transversely from the duct throughout the whole width of the compartment, said air then passing up through the belt and tobacco carried thereby into the top of the compartment, from which portion of the compartment a certain proportion is allowed to escape through the vent-pipes G G', one or the other, or both, of which may be opened more or less, so as to regulate to a certain extent through which portion of the compartment the greatest draft shall take place; but said vent-ducts are kept sufficiently closed to maintain a pressure in the whole compartment. Near the inner end of the drying-compartment exhaust-pipes H lead from below the belt to the heating-chamber I, communicating with the blower F, and thus the said heating-chamber and blower receive a large proportion of the air from the drying-chamber itself. The air passing from the casing to the heating-chamber is caused to pass downwardly through the tobacco and belt by reason of a partition K, located below the belt and between the entrance-duct E and discharge-pipes H, although, if desired, other pipes H' may be located above the pipes H and belt and also communicate with the chamber I for drawing off a portion of the heated air from above the belt. Fresh air may be taken to the heating-chamber I by means of the fresh-air induction-opening, having doors I' and located at the end of the heating-chamber, and the heat is preferably supplied by a steam-coil I², located in the chamber I and receiving steam from the engine-exhaust or from a suitable boiler, as desired. By this arrangement, wherein a large proportion of the air supplied to the blower is taken from the drying-compartment itself, not only is a material saving of fuel effected by the preliminary heating of the fresh air due to the commingling of the heated air therewith, but the temperature may be maintained higher than would otherwise be practicable without the use of high-pressure steam.

To secure an effective distribution of the air forced into the drying-compartment through the duct E, the sides of said duct are preferably formed by doors or vanes E', hinged at the upper edge and adapted to be opened more or less, so as to deflect the air toward the bottom of the compartment and

cause the same to spread out beneath the belt and pass thence in a uniform current up through the tobacco without exerting any appreciable lifting effect thereon, such as might disturb its position on the belt or cause the formation of openings through which too great a proportion of the air might travel to the detriment of the drying effect on the remaining portions.

In the forward travel of the belt the tobacco is carried through the cooling-compartment, wherein the heat imparted to the tobacco in the drying-compartment is extracted, and this cooling-compartment may be of short length; but the arrangement is preferably such that a relatively large volume of air is carried through the compartment and through the belt and tobacco lying thereon. For this purpose a horizontal fan L is located, preferably, in the top of the compartment, and openings in the walls of the casing A above and below the belt are provided, preferably, in a direct line with the fan for the escape and admission of air, and the fan itself may be rotated, so as to move the air either upwardly or downwardly through the tobacco, as desired, although for different grades of tobacco it is desirable to drive the air in different directions—that is to say, for very light and fine tobacco the air should be driven downwardly in order to prevent the raising or lifting of the tobacco away from the belt, whereas with heavier tobacco the air should be driven upwardly in order to loosen up the tobacco and permit the air to penetrate every portion of the same in its passage through this compartment.

The two compartments thus far described—namely, the drying and cooling compartments—are compartments wherein the tobacco has practically all of the moisture extracted therefrom, and being as a consequence in an exceedingly dry state it is very liable to catch fire from any sparks created by the friction of the belt or through spontaneous combustion or electrical action, and although a fire of this character will not assume serious proportions if observed and extinguished immediately nevertheless in apparatus as heretofore made it has been found practically impossible to observe the initial blaze or smoking of the tobacco or to get at and extinguish the same because of the double side walls. With a view to permitting the operators, who are always in place at the end of the machine during the time the machine is being run, to keep the tobacco before it reaches the damp ordering-section always under observation I now locate in the end wall of the casing a window M, suitably glazed, and in the partition C between the drying and cooling compartments a corresponding window M', and if other partitions are located at any point in the line of observation from one end of the machine through to the farther side of the cooling-compartment corresponding windows are located in said

partitions. With this construction the operators standing at the feeding end of the machine have an uninterrupted view through all of the compartments where fire is at all likely to originate, and should such fire originate at any time it may be quickly and easily extinguished by means of a hand-hose through one of the side doors, windows, or hand-holes. There being no flues in the side walls of the casing, there is no chance of the fire spreading to any hidden locality or working into inaccessible places about the machine.

From the cooling-compartment the tobacco is carried by the belt into the ordering-compartment—that is to say, a compartment wherein the tobacco is heated and moistened uniformly before being discharged from the machine ready to be packed or to be subjected to further-processes of manufacture. In the present apparatus this ordering-compartment is provided with air-circulating fans operating to draw the air from that portion of the compartment below the belt up through the belt and force the same downwardly through the belt at another point. Referring to the drawings, Fig. 1, it will be seen that the fans N and N' are located in subcompartments formed by the subpartitions O and O', which partitions do not extend to the top or bottom of the compartment, but, on the contrary, have air-spaces above and below them which communicate with that portion of the ordering-compartment located between the two subpartitions O and O'. The fans being rotated causes a circulation of the air upwardly on the outside of the subpartitions O O' and downwardly in the space between said partitions, and during the running of the machine this circulation is maintained constantly and the air in the compartment is moistened or humidified to a sufficient degree to impart the necessary moisture to the tobacco carried by the belt. The moisture is supplied to the air in this compartment, preferably, by perforated spray or atomizing pipes P and P', leading in through the side walls of the compartment and adapted to discharge steam and water, which steam and water is admitted to said pipes in proper proportions by means of stop-cocks P², located in a convenient position with relation to the casing and arranged, preferably, as shown in Fig. 5. In this figure, P³ indicates a water-pipe, and P⁴ a steam-pipe. These pipes are branched and communicate with the atomizing-pipes P and P', the branches p³ of the water-pipe discharging at a point well within the pipes P P', the arrangement operating very much in the manner of an injector, thereby preventing any back pressure in the water-pipes and insuring a thorough atomization of the water prior to its discharge into the ordering-compartment. The bottom of this ordering-compartment is preferably in the form of a pan or tank Q, in which any drippings will be caught and may be conducted from the machine, and said compartment is also preferably provided with heating-coils

R for steam, whereby the temperature of the compartment may be raised or maintained, although, save in cold weather, it will not be necessary to use such heating-coils, save when the machine is first being started and before the heat of the steam discharged with the water in the form of an atomized mixture is sufficient to raise the temperature of the compartment to the desired degree.

The ordering-compartment may, if desired, be provided with an escape or vent duct S, located at the top, and to change the air therein, which, however, will seldom be necessary, the escape-duct may be opened and the door B below the belt also opened for the admission of fresh air.

Passage of air from one compartment to another is prevented by flexible gates T, preferably formed of fabric and suspended from the partitions and end walls of the casing, so as to rest lightly upon the belt or tobacco carried thereby, and the passage of air into the heating-chamber I through the pipes H' and H may be conveniently controlled by slide-gates h' and h, respectively, which are adapted to entirely close or permit any of said pipes to be opened at will.

Oil-drip pans W are located below each fan-shaft to catch any drip from the bearings and conduct the same away from the conveyer.

In operation the tobacco is placed on the belt D adjacent the roller d' at the entrance end of the machine and passes successively through the drying-compartment, the cooling-compartment, and the ordering-compartment, being discharged over the roller d'. In its passage through the drying-compartment it is subjected to the action of heated air driven in by the blower F through the duct E and forced from below the belt up through the tobacco to a point above the belt, where a proportion of it may be withdrawn through the exhaust-ducts G or G' and the remaining portion forced back down through the belt and tobacco and discharged by the pipes H into the heating-chamber I, serving to temper the fresh air admitted by the opening of the doors I' and being carried with said air through the heating-coils and again forced into the drying-chamber by the blower. By the proper regulation of the dampers the air in the drying-chamber may be maintained under pressure and being heated to a high degree will serve to extract practically all of the moisture from the tobacco. As the tobacco leaves the drying-compartment it is subjected to the second action of the heated air, which passes down through the belt and tobacco on its way to the heating-chamber. In the cooling-compartment the tobacco is subjected to a relatively slow-moving but large volume of air at the temperature of the external atmosphere, whereby the tobacco is cooled and made ready to receive the moisture in the ordering-compartment. In the latter compartment the humid air is caused to pass through the belt and tobacco a number of times, each por-

tion of the tobacco being subjected to practically a constant current of moisture-laden air throughout the whole of the time it is within the ordering-compartment, whereby the moisture is caused to penetrate every portion of the tobacco, and the tobacco is discharged in a thoroughly uniform, moist, and well-ordered condition.

By reason of the small number of fans and other moving parts it is found that little power is required to operate the machine, and at the same time a greater quantity of tobacco may be handled and more uniformly treated than with prior machines of this character.

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

1. In a tobacco-handling apparatus, the combination with a casing divided into drying, cooling and ordering sections, and a foraminous conveyer traveling through said sections successively for conveying tobacco there-through, of an independent heating-chamber opening into the casing at independent points below the conveyer, a blower for maintaining a circulation of air through the chamber and casing, a regulated vent-opening in the casing above the conveyer, a regulated fresh-air-induction opening in the heating-chamber and a partition in the casing below the conveyer and between the openings connecting the casing with the heating-chamber, whereby the air is caused to pass through the conveyer and tobacco carried thereby in opposite directions in its circulation through the casing and heating-chamber; substantially as described.

2. In a tobacco-handling apparatus, the combination with a casing divided into drying, cooling and ordering sections and a foraminous conveyer traveling through said sections successively for conveying the tobacco therethrough, of an independent heating-chamber, a duct leading from said chamber to the casing on one side of the conveyer, a blower for forcing the air from said chamber through said duct, ducts having regulating-valves leading from the casing on both sides of the conveyer to the heating-chamber, a partition between the duct leading into the casing and the duct leading from said casing on the same side of the conveyer, a regulated venting-aperture in the casing and a regulated fresh-air-induction aperture for supplying fresh air to the heating-chamber; substantially as described.

3. In a tobacco-handling apparatus, the combination with a casing divided into drying, cooling and ordering sections a foraminous conveyer traveling through said sections successively for conveying the tobacco there-through, fans for maintaining a circulation through the conveyer and tobacco carried thereby in the cooling and ordering sections and a moisture-supplying mechanism in the ordering-section, of a heating-chamber, a duct leading therefrom to the drying-section below the conveyer, a blower for forcing the air

from the heating-chamber through said duct, a duct leading from the casing below the conveyer to the heating-chamber, a partition in the casing below the conveyer between said ducts, a fresh-air-induction opening and doors for regulating the same in the heating-chamber and venting-ducts in the casing above the conveyer near opposite ends of the section and valves for regulating said ducts; substantially as described.

4. In a tobacco-handling apparatus, the combination with the casing divided into drying, cooling and ordering sections, a foraminous conveyer traveling through said sections and means for maintaining a circulation of air in the drying and cooling sections, of subpartitions in the ordering-section having openings at top and bottom of the same and through which subpartitions the conveyer passes, and whereby the ordering-section is divided into subsections, means for maintaining a circulation of air in said subsections through the conveyer in opposite directions and a moisture-supplying mechanism in said ordering-section; substantially as described.

5. In a tobacco-handling apparatus, the combination with the casing divided into drying, cooling and ordering sections, a foraminous conveyer traveling through said sections and means for maintaining a circulation of air in the drying and cooling sections, of subpartitions in the ordering-section having openings at top and bottom of the same and through which subpartitions the conveyer travels and whereby the ordering-section is divided into subsections, air-forcing mechanism for maintaining air-circulation through the conveyer in the central subsection in one direction and through the conveyer in the end subsections in the opposite direction, and a moisture-supplying mechanism in the ordering-section below the conveyer; substantially as described.

6. In a tobacco-handling apparatus, the combination with the casing divided into drying, cooling and ordering sections, a foraminous conveyer traveling in said sections and means for maintaining a circulation of air in the drying and cooling sections, of subpartitions in the ordering-section having openings at top and bottom of the same and through which subpartitions the conveyer travels and whereby the ordering-section is divided into subsections, fans located in the end subsections and both operating to force the air into the central subsection on the same side of the conveyer whereby the air is caused to pass through the conveyer in one direction in the end subsections and in the opposite direction in the central subsection, and a moisture-supplying apparatus in the ordering-section below the conveyer; substantially as described.

7. In a tobacco-handling apparatus, the combination with the casing divided into drying, cooling and ordering sections independent means for maintaining a circulation of air in each of said sections and a foraminous conveyer traveling through said sections succes-

sively for carrying tobacco therethrough, of a moisture-supplying apparatus for the ordering-section embodying atomizing-pipes in the section below the conveyer, steam-pipe connections with said atomizing-pipes for supplying steam thereto and water-pipes extending into said steam-pipe connections and discharging in the direction of travel of steam

in said pipes, whereby back pressure is prevented and a full water-supply for atomization insured; substantially as described.

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