

No. 616,293.

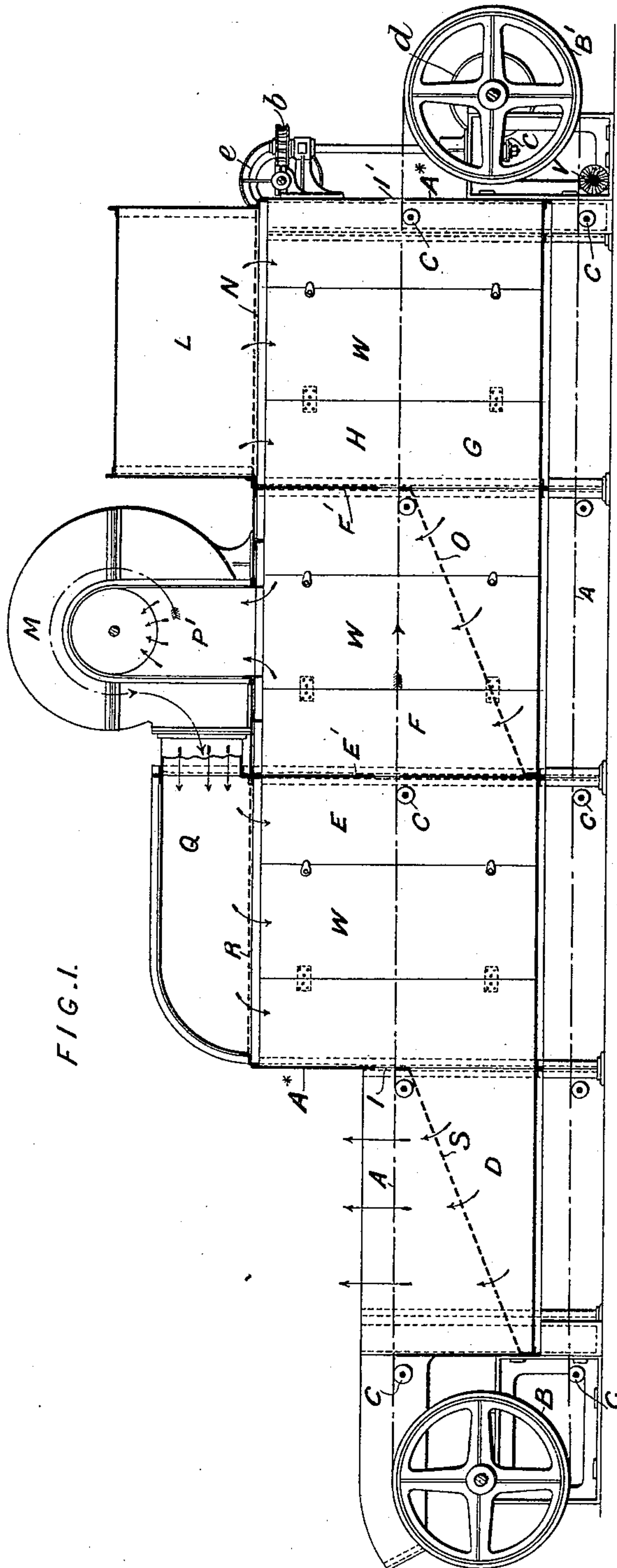
Patented Dec. 20, 1898.

S. C. DAVIDSON.
DRIER FOR TOBACCO, &c.

(Application filed July 24, 1897.)

(No Model.)

4 Sheets—Sheet 1.



WITNESSES:

Fred White
Thomas F. Wallace

INVENTOR:

Samuel Cleland Davidson,

By his Attorneys:

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Arthur C. Fraser & Co.

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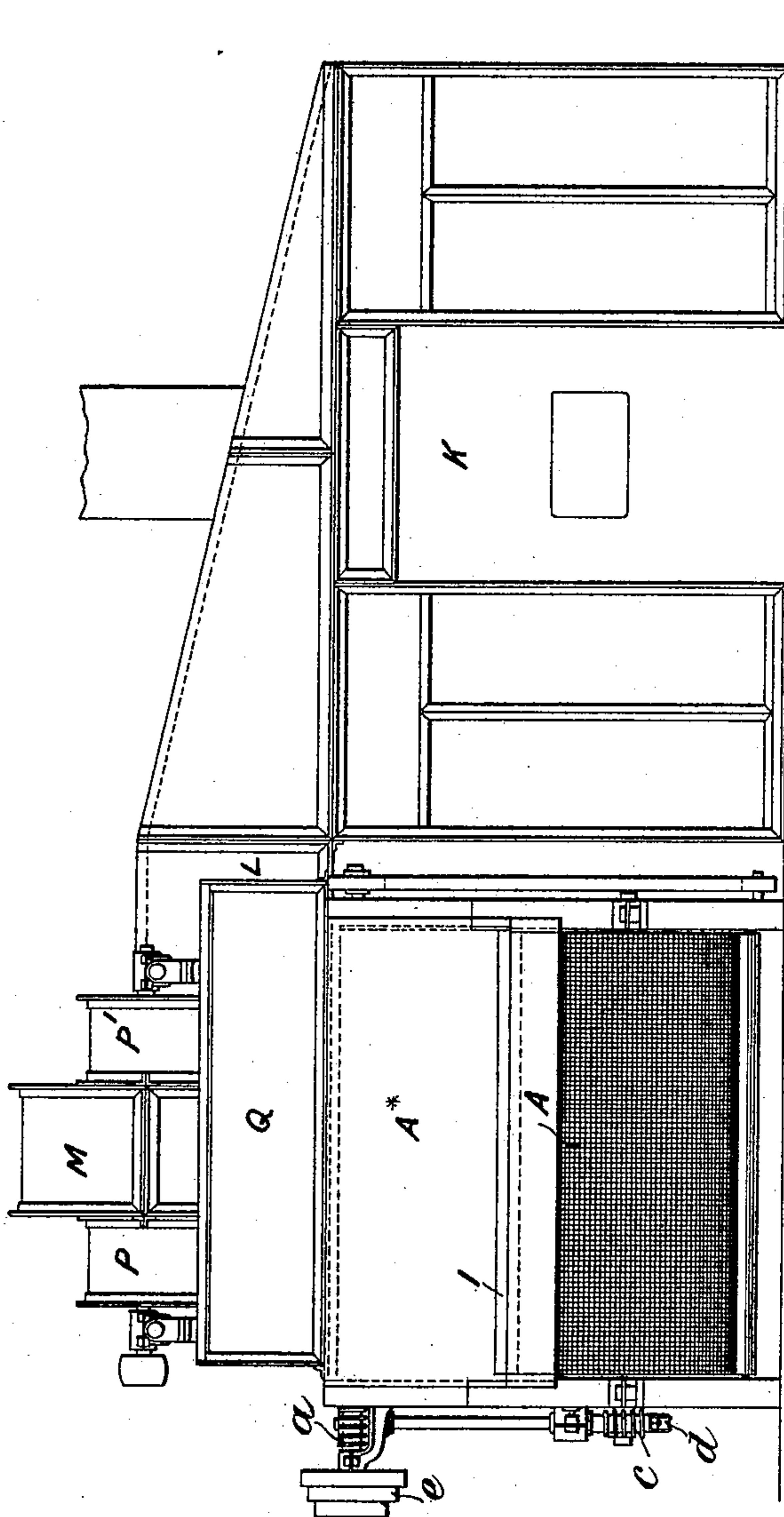
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4 Sheets—Sheet 2.

FIG. 2.



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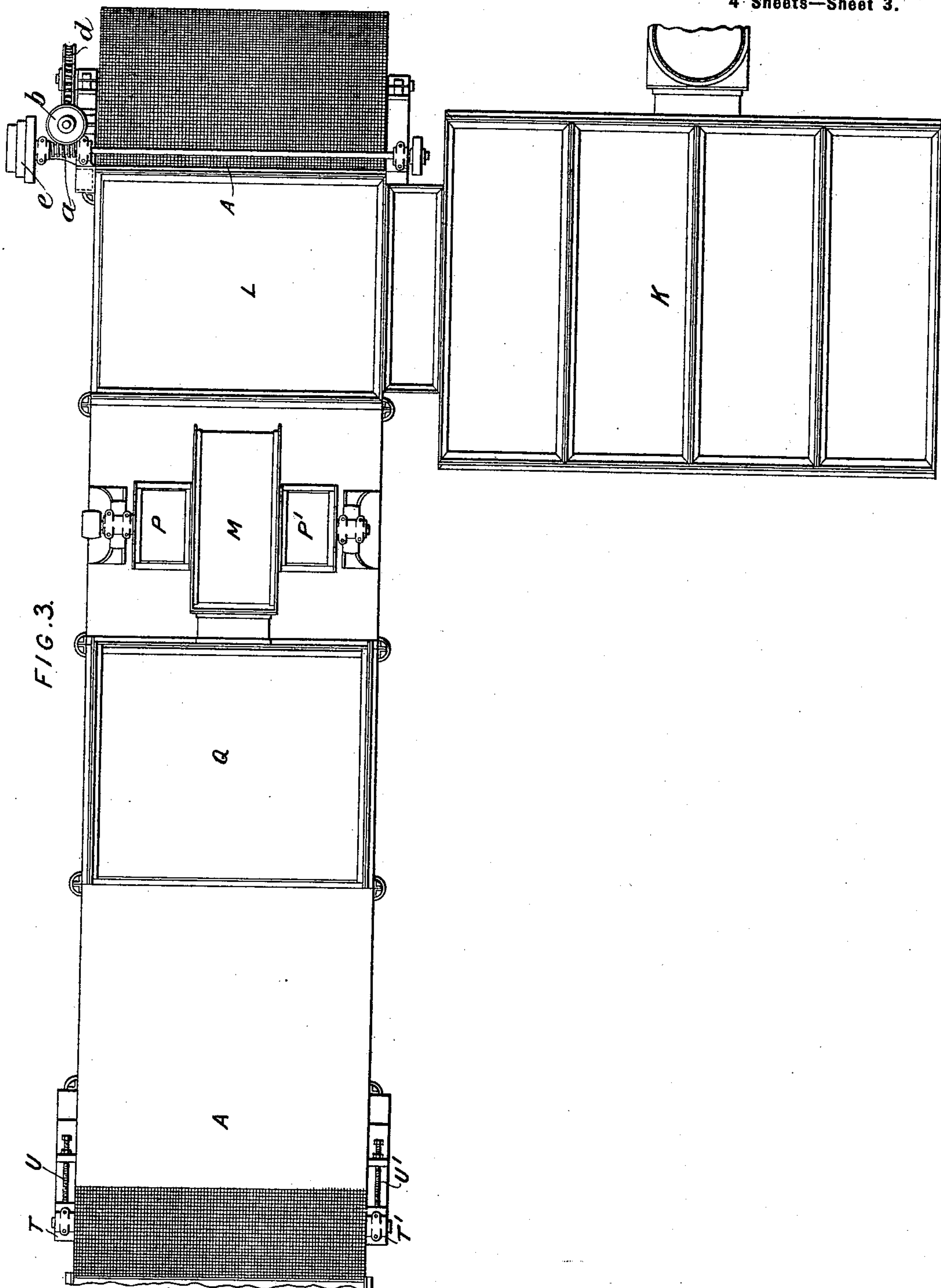
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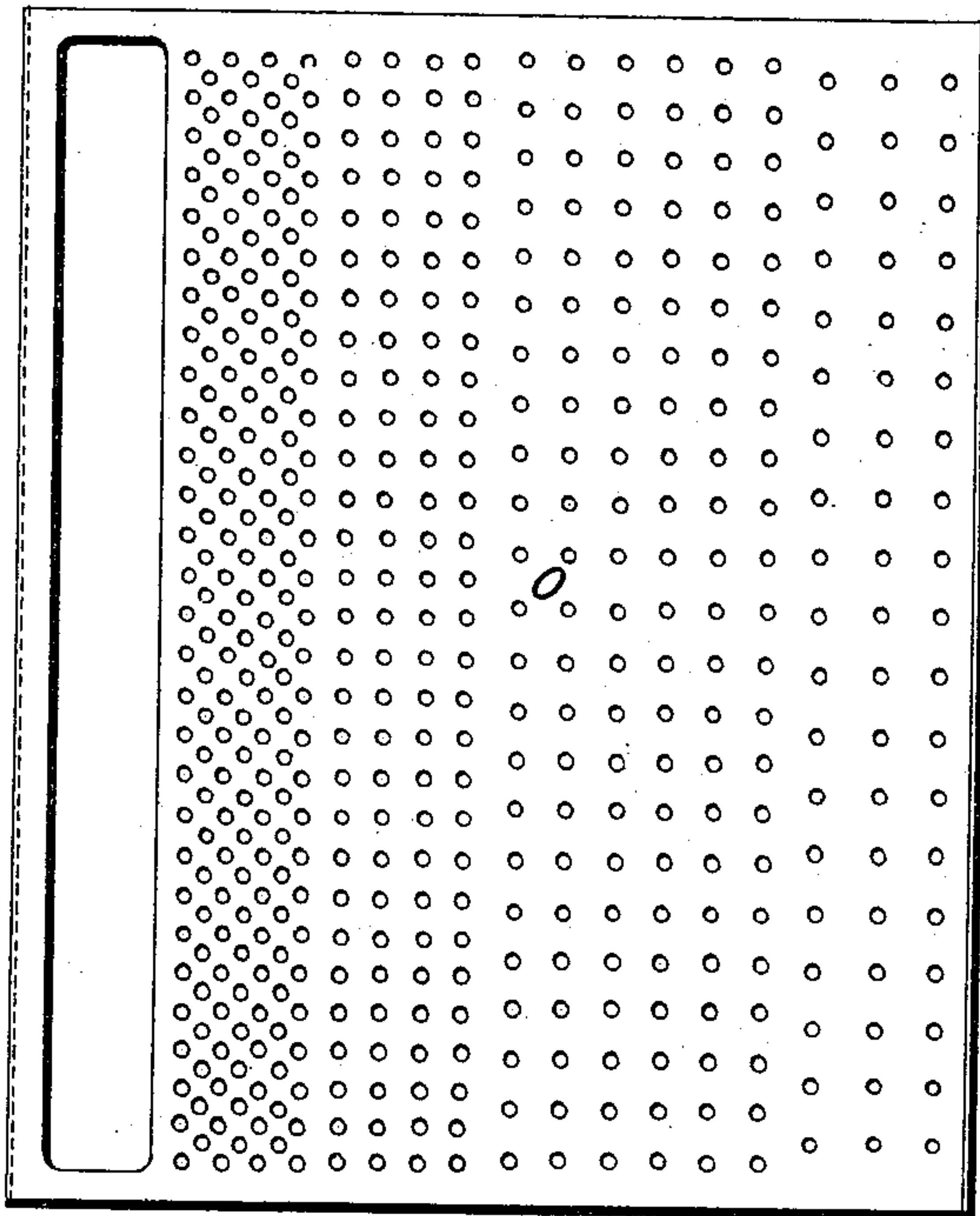
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4 Sheets—Sheet 4.

FIG. 4.



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UNITED STATES PATENT OFFICE.

SAMUEL CLELAND DAVIDSON, OF BELFAST, IRELAND.

DRIER FOR TOBACCO, &c.

SPECIFICATION forming part of Letters Patent No. 616,293, dated December 20, 1898.

Application filed July 24, 1897. Serial No. 645,825. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL CLELAND DAVIDSON, merchant, of Sirocco Engineering Works, Belfast, Ireland, have invented certain new and useful improvements in apparatus for the drying or other treatment of tobacco-leaf, grain, malt, fruits, and other substances, (which invention is the subject of Letters Patent in Great Britain, No. 15,106, dated June 23, 1897; in India, No. 306 of 1897, dated February 9, 1898, and in Ceylon, No. 563, dated January 18, 1898,) of which the following is a specification.

My invention has reference to apparatus for the drying or other treatment of tobacco-leaf, grain, malt, fruits, and other substances.

The chief features of the invention are the passing of a current of hot or dry air or mixed gas and air twice or oftener through the tobacco-leaf or other substance as this is being carried by a traveling web of foraminous material through a chamber or inclosure, (hereinafter called the "web-chamber,") the current passing alternately downward and upward through the web, a special construction of the web-chamber, whereby the said current is caused to follow a serpentine course, so as to pass through the web downward and upward alternately, and whereby the distribution of the current is approximately equalized over the whole area of the web, a special disposition or location relatively to the web-chamber of a current-producing fan and air-ducts whereby the current from the air-inlet end of the web-chamber up to an intermediate point of same is an exhaust or suction current and the current through the remainder of the web-chamber is a pressure-blast, and the general construction and arrangement of the whole apparatus.

Having stated the chief features of the invention, I will now describe an apparatus in which the invention is embodied.

The body of the apparatus consists of a horizontal box or inclosure, being what I call the "web-chamber," mounted on a suitable stand or legs and divided internally into upper and lower compartments by a web of any suitable foraminous material, such as wire web, which is arranged to pass through the web-chamber from end to end and about midway between top and bottom. This web is

mounted upon and moved by two revolving drums, one at each end and outside of the web-chamber, and is so adjusted thereto that the under portion of the web returns below the bottom and outside the chamber, as shown. The upper and lower compartments of the web-chamber are also divided into sub-compartments by means of cross-partitions, so arranged that when a current of air is passed through the web-chamber from either of its ends to its center, as in one modification hereinafter described, or from end to end, as in another modification, it must necessarily pass alternately down and up as a serpentine-like current through the web dividing the upper end and lower compartments. In order to equalize the distribution of this current over the whole area of each section of the web which is exposed thereto, I insert in each of the subcompartments formed by the cross-partitions a perforated plate either above or below the section of the web through which the current is to pass in its course from one subcompartment above to another below, or vice versa. The said distributing-plates have their perforations so arranged that the current in passing through the same is evenly distributed over the next intervening surface of the web, the area of perforations through said plate being for this purpose less at the end which is toward the advancing current than toward the farther end, where the same may consist of one large oblong opening, or the plate itself may be terminated, so as to leave an open space equivalent to said oblong opening.

To create the current through the web-chamber, I employ a fan mounted, according to one modification, preferably on top of and over the two central subcompartments above the web, and I connect the eye of the fan by a port and duct to one of these subcompartments and the nozzle to the other, so that the fan will draw the air out of the subcompartment connected to the eye of the fan by suction and propel it into the other, which is connected to the nozzle of the fan. The effect of employing the fan in this way is that from the air-inlet end of the web-chamber to the fan the air-current is created by exhaust or suction and from the fan to the opposite end by pressure-blast. Above the top sub-

compartment at the suction end of the web-chamber I fit a supply-duct to be connected with any suitable apparatus or stove for producing hot or dried air, gaseous or mixed gas and air, (hereinafter referred to as the "air-current,") and I preferably make the bottom of such supply-duct with a perforated plate to distribute the air evenly over the top surface of the section of the web below same.

In working the apparatus the tobacco-leaf or other material to be treated is fed onto the exposed upper surface of the web at the feed end, and, the web being in motion, the leaf or material is carried thereby through the web-chamber. The suction of the fan draws the air first down through the web and the material thereon into the subcompartment below same, which is double the length of the first or inlet one on top, and as its passage along this subcompartment is blocked by the cross-partition forming its farther end the current now passes upward through a second perforated plate below the next section of the web, through which the current passes to evenly distribute it over the bottom of same, after which the current may, if the apparatus be required of larger size, be made to take farther down and up courses through the web, in which case the web would be equivalently longer; but I usually construct the apparatus so as to let the current then go into the fan out of the top of the second upper subcompartment, and after passing through the fan it is then reintroduced by pressure-blast into the top of the third upper subcompartment through a perforated distributing-plate and driven down through the section of web then below same to the second of the lower subcompartments and then through another perforated distributing-plate to the bottom of the next section of the web, and after passing upward through same I usually then allow the air to escape.

Either end of the machine may be made the feed end, according to the direction in which the web-drums are revolved; but usually the most economical results are obtained by making the feed end that at which the air escapes after its transit through the web-chamber.

The material fully dried or treated is carried over the end drum and thereby discharged off the web, after which the web is brushed clean of any adhering leaf or material by a revolving brush for this purpose. The web-drums may be driven in any suitable manner to give the web the proper speed of movement.

In the accompanying drawings, Figure 1 is a central longitudinal section, but with the fan shown in elevation, of an apparatus constructed in accordance with this invention. Fig. 2 is an elevation of the apparatus as seen from the feed end. Fig. 3 is a plan of the apparatus. Fig. 4 is a plan view, on a larger scale, of the perforated distributing-plate O.

In the figures, A is the endless woven-wire web carried on the two revolving drums B B' and supported between same by the rollers C.

A^x is the web-chamber, through which the upper portion of the wire web A, on which the material to be treated is carried, travels in the direction indicated by the arrow. This chamber is divided into upper and lower compartments by the web A, which compartments are further divided into subcompartments D, E, F, G, and H by the cross-partitions E' and F'; but the number of these subcompartments may be increased according to requirements.

I and I' are openings in the ends of the compartments E and H for the entrance and exit, respectively, of the wire web.

K is the air-heating apparatus or stove. It is connected to the top of the upper subcompartment H by an air-duct L.

M is a fan mounted upon the top of the upper subcompartment F. This fan draws the hot air (supplied by the stove K) through the duct L, down through the perforated plate N into the upper subcompartment H, and through the wire web A, with the material thereon, into the lower subcompartment G, thence through the perforated plate O, (separately shown in Fig. 4,) and again through the wire web A into the upper subcompartment F, then through the air-ducts P P' into the eye of the fan M. The air is then delivered under pressure into the pressure-duct Q, down through the perforated plate R into the upper subcompartment E, again through the wire web A into the lower subcompartment D, and through the perforated plate S, (which is the same as the plate O, shown in Fig. 4,) and up again through the wire web A, after which it escapes into the open air. The bearings T T' of the shaft carrying the drum B at the feed end of the machine are fitted with adjusting-screws U U', so that the web A may be kept sufficiently strained for satisfactory working.

V is a rotary brush for removing any material clinging to the wire web A.

W W are inspection and cleaning doors.

The web A is driven by means of the drum B' at the delivery end of the machine by any suitable gear. That shown is an arrangement of worm-gearing a b c d, operated by the driving-pulleys e.

By utilizing, as above described, both exhaust and pressure blast of the fan for passing the air-current through the web-chamber less power is required to drive the fan for passing a given volume of air-current through the web-chamber than if either suction or pressure alone were employed for this purpose.

What I claim, and desire to secure by Letters Patent, is—

1. In apparatus for drying or treating tobacco-leaf, grain, malt, fruit or other substances by a current of hot or dry air or mixed gas and air, having a drying-chamber, a carrying-web traveling horizontally from end to end of said chamber approximately midway between the top and bottom of same, open-

ings at opposite ends of said chamber respectively for the entrance and exit of the web and the substance it carries, and transverse partitions in said chamber substantially as set forth, inclined perforated plates disposed across the compartments in said chamber and having the area of the perforations less at the end which is toward the advancing current than toward the farther end, whereby the current of air or of gas and air is distributed equally over the whole area of the web in said compartments, substantially as hereinbefore described.

2. In apparatus for drying or treating tobacco-leaf, grain, malt, fruit or other substances by a current of hot or dry air or mixed gas and air, the combination with a drying-chamber having an air-inlet and an air-outlet, and a carrying-web traveling horizontally from end to end of said chamber approximately midway between the top and bottom of same, said chamber having at opposite ends openings respectively for the entrance and exit of the web and the substance it carries, of a fan centrally situated relatively to said chamber, an air-distributing screen between said air-inlet and said web, an air-duct leading from one part of said chamber to the suction side of said fan, and an air-duct leading from another part of said chamber to the discharge side of said fan, substantially as shown, whereby the current from the air-inlet end of the drying-chamber up to an intermediate point of same is an exhaust or suction current into the fan, and the current through the remainder of said chamber is a pressure-blast from said fan, said suction and pressure blasts being both produced by the operation of the one individual fan.

3. In apparatus for drying tobacco-leaf, grain malt, fruit or other substances by a current of hot or dry air, the combination with a drying-chamber divided into compartments, a carrying-web traveling horizontally from end to end of said chamber approximately midway between the top and bottom of same, said chamber having openings at its opposite ends respectively for the entrance and exit of the web and the substance it carries, and an air-heating apparatus, of an air-duct leading

from said air-heating apparatus to one of the end compartments of said chamber and supplying heated air thereto, a fan centrally situated in said drying-chamber and having an air-duct leading from an intermediate compartment of said chamber to the suction side of the fan, and an air-duct leading from the discharge side of said fan to another intermediate compartment of said chamber, an air-distributing screen between the latter air-duct and said web, and an air-outlet at the other end compartment of said chamber, whereby the employment of one individual fan produces both the exhaust and pressure blast for passing the current of air or of gas and air through the chamber, substantially as hereinbefore described.

4. In drying apparatus, the combination with a drying-chamber having end walls A^x , and internal partitions E' and F' having web-apertures, of a web A traversing said chamber, passing through said apertures and dividing the chamber into upper and lower compartments D , E , F , G and H , an air-inlet supplying air to the compartment H above the web, an air-distributing screen N crossing said air-inlet, an air-passage through the partition F' from the chamber G beneath the belt to the chamber F , an air-duct P' taking air from the compartment F above the belt, a fan M connected at its suction side to the duct P' , an air-duct Q connected with the discharge side of the fan and discharging into the compartment E above the web, an air-distributing screen R between said duct and the web, an air-opening below the web from the compartment E to the compartment D , and an air-outlet above the web from the compartment D , whereby one fan suffices to create a current through the chamber, and the current through the compartments G and F is a suction-current, while that through the compartments E and D is a pressure-blast.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

SAMUEL CLELAND DAVIDSON.

Witnesses:

JOHN BROWN SHAW,
ARCHIBALD H. R. CARR.