

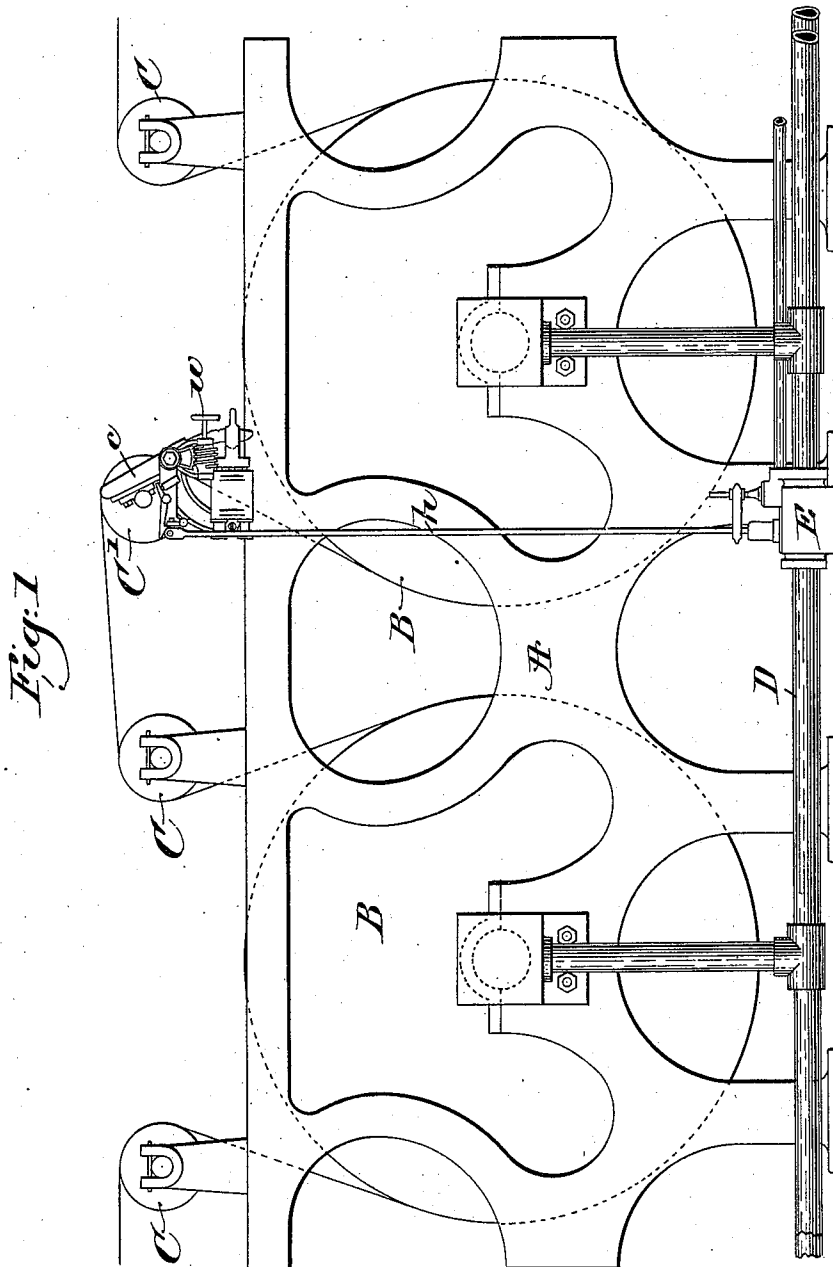
(No Model.)

3 Sheets—Sheet 1.

P. DILLON.
DRYING MACHINE.

No. 576,757.

Patented Feb. 9, 1897.



Witnesses:
Edward F. Allen.

Thomas J. Drummond.

Inventor:

Peter Dillon.

by Crosby Gregory
attys.

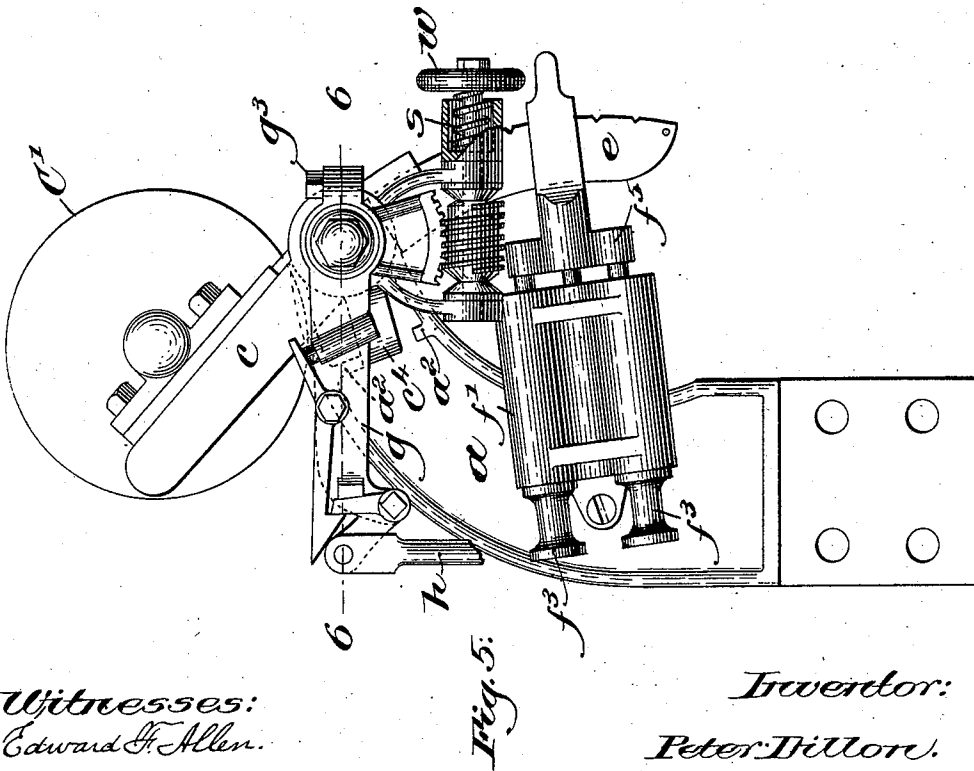
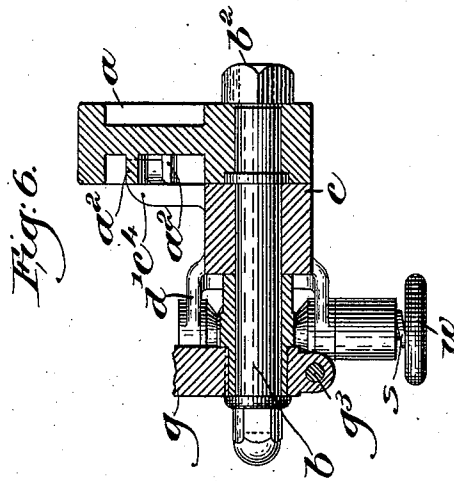
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3 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

PETER DILLON, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO HENRY C. KING, OF SAME PLACE.

DRYING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 576,757, dated February 9, 1897.

Application filed May 29, 1896. Serial No. 593,562. (No model.)

To all whom it may concern:

Be it known that I, PETER DILLON, of Lawrence, county of Essex, State of Massachusetts, have invented an Improvement in Drying-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to improvements in the drying-machine patented to me March 10, 1891, No. 448,181, the object of my present invention being to improve and simplify the mechanism and operation of my patented device.

In my patented drying-machine above mentioned the web of paper, as it passes around the drying-cylinders and over the guide-rolls, automatically regulates the supply of steam by the contraction and expansion of the paper, accordingly as it is dried to a greater or less degree. The mechanism which thus controls the steam-supply moves the cut-off valve with an initial movement, due to the stretching or shrinking of the paper, and then continues the movement of the cut-off valve by reason of the rotation of the adjacent guide-roll.

It is one object of my present invention to make the operation of the cut-off valve positive and definite, depending solely upon the web of paper or other material which is being dried and not depending on the rotation of the guide-roll. In connection with the mechanism for attaining this positive and definite movement mentioned I provide means whereby the operator may adjust with the utmost nicety the degree of movement transmitted to the cut-off valve. In order to make this capability of adjustment very delicate, I have preferably made all the parts relatively adjustable, including a compound adjustment for the tension device, and this, taken in connection with the other adjustments, renders the device extremely sensitive.

Further advantages of my invention will appear in the course of the following detailed description, which, taken in connection with the accompanying drawings, fully sets forth my invention.

In the drawings, Figure 1, in side elevation, shows a sufficient portion of a drying-machine with my improvements attached thereto in

operative position to render the operation thereof understood. Fig. 2 is an enlarged detail, in side elevation, of one form of my improved attachment. Fig. 3 is a corresponding detail in end elevation. Fig. 4 is a broken horizontal section taken on the dotted line 4 of Fig. 2. Fig. 5 is a fragmentary detail, in side elevation, of another form of my invention. Fig. 6 is a horizontal section thereof similar to that shown in Fig. 4 and taken on the line 6, Fig. 5.

The frame A, the steam-heated drying-cylinders B, the guide-rolls C C', the steam-conducting pipes D, and the valve mechanism E are of any usual or desired construction, the paper passing from left to right, Fig. 1, around one heating-cylinder and over the two intermediate guide-rolls C C', and thence around the second drying-cylinder and onto the other machinery for further treatment.

My invention has to do with the mechanism shown in connection with the guide-roll C'.

Referring particularly to Fig. 2, *a* designates a bracket preferably provided with suitable means, as the bolt-holes *a'*, for securing the same in the desired location on any drying-machine. At its upper end the bracket *a* receives a bearing *b*, on which is mounted the supporting-arm *c* on which the guide-roll C' is journaled, the journal-bearings *c'* thereof being preferably longitudinally adjustable on the arm *c*, as by means of the T-recesses *c²* herein shown. This supporting-arm *c* may be either journaled directly on the bearing *b*, as shown in Fig. 6, or it may be journaled on the hub *d*, as shown in Fig. 4. Extending downwardly is the tension-lever *e*, notched at its outer edge to receive the eye *f* of the free end of the tension device. This lever *e* is shown as preferably secured in rigid adjustment on the hub *d*, or it may be formed integrally with the arm *c*, as shown in Fig. 6. In the former instance the arm *c*, being mounted to turn loosely on the hub *d*, is capable of adjustment relatively to tension-lever *e* by means of the set-screw *c³*.

The tension device consists, preferably, of one or more chambers *f'*, two being shown in the present instance, to receive suitable coiled springs *f²*, which are held therein at one end by the closed end of the chambers and at the

other end by the adjustable thumb-nuts f^3 , screwed onto the outer ends of the spindles f^4 , carried by a cross-head f^5 of the outer free end of the tension device, a central guide-spindle f^6 being also preferably provided in order to insure precision of movement of the tension device. The chambers f^7 are pivotally mounted at f^7 on the lower end of an arm f^8 , Fig. 2, or on the fixed bracket a , Fig. 5.

Referring to Figs. 3 and 4 it will be seen that the upper end of the arm f^8 has a boss f^9 centrally mounted on the bearing b , the latter being provided, preferably, with a shoulder b' , bearing against the end of the boss f^9 , and holding the arm f^8 in rigid contact with the bracket a by means of the nut b^2 . This arrangement renders the support of the various moving parts perfectly rigid and yet leaves the parts beyond the shoulder b' free to turn easily on the bearing b .

In order that all the parts may be adjusted relatively to the bracket a , I have provided the boss f^9 with an annular T-recess f^{10} to receive the heads of the bolts f^{11} , so that by loosening the bolts f^{11} and also slightly loosening the nut b^2 all the parts may be turned into the desired position relatively to the bracket a . This arrangement permits the placing of the bracket in any position found most convenient on any of the usual drying-machines, the remaining parts of the mechanism then being adjusted, as required, to correspond with the necessary position of the bracket. At its outer end the bearing-shaft b carries a valve-operating lever g free to turn thereon. This lever g is connected to move in unison with the arm c , carrying the guide-roll C' .

In the present instance of my invention the connection therewith is by means of a worm-sector g' and a worm g^2 , the latter being mounted in the hanger d' , extending from the hub d , Fig. 3, or formed integrally with the arm c , Fig. 6, and being provided with suitable operating means, (herein shown as the hand-wheel w .) The worm-sector g' may be formed in one piece with the lever g in the form of a bell-crank, as shown in Fig. 2, or it may be independent thereof, as shown in Fig. 6, the lever g in the latter case being adjustably clamped thereon by suitable means, as by the bolt g^3 . At its free end the lever g carries the valve-operating rod h , the latter being connected therewith by means of the link h' , pivoted at h^2 and h^3 , and having a projection h^4 to receive the latch g^4 in locking engagement therewith, the latter being pivotally mounted at g^5 on the valve-operating lever g and normally held in locking engagement, as shown in Fig. 2, by means of the spring g^6 , bearing against the extended end g^7 thereof. The latch g^4 normally holds rod h under the control of the mechanism above described, but by raising the catch end thereof the rod h may be disengaged and the valve entirely closed.

Referring to Fig. 5, it will be seen that I

have made provision for taking up the wear of the worm-gear g^2 , in order that the adjustment by means thereof may be absolutely accurate, this provision being shown as a coiled spring s , bearing at one end against the hand-wheel w and at its other end against the outer end of the adjacent bearing, thereby tending always to maintain the worm tightly against said bearing and also holding the worm against accidental rotation.

Referring to Figs. 3 and 4, it will be noticed that the hub d is provided with a spur d^2 , extending therefrom into a slot f^{12} in the boss f^9 , thereby limiting the relative swinging movement of the arm c . This provision is shown in Fig. 5 as made by opposite lugs a^2 , formed on the arm a to limit the movement of the stub arm or spur c^4 , projecting from the bearing of the arm c .

In operation as the paper passes around the drying-cylinders B more or less moisture is dried out of the web of paper, according to the temperature of the cylinders, due to the amount of steam admitted thereto. Accordingly the paper stretches or contracts to a corresponding degree as it passes over the fixed intermediate guide-roll C and the swinging guide-roll C' , the latter maintaining an even tension on the paper or other material being dried, according to the degree of tension maintained in the springs f^2 . It will be evident, therefore, that as the paper contracts the guide-roll C' and its supporting-arm c will swing correspondingly toward the left, Fig. 1, and will instantly transmit precisely the same movement through the valve-controlling arm g to the valve mechanism E , thereby cutting down the amount of steam admitted to the drying-cylinders. As the latter become cooler and the paper therefore loses tendency to shrink and becomes more yielding to the springs f^2 of the regulating device the latter will recover its normal position, the guide-roll C' swinging back toward the right and transmitting the same definite movement through the arm c and lever g to the valve-controlling rod h and correspondingly admitting more steam.

If it is found that the apparatus does not work evenly, the same can be adjusted with absolute accuracy and to the most perfect degree of nicety by changing the relative positions of the different parts to accommodate the apparatus to different materials being dried, or, if it be paper, to different qualities of paper and to different kinds of drying-machines, conditions of the atmosphere, &c. This adjustment can usually be accomplished to the degree required simply by turning the hand-wheel w and rocking the lever g slightly up or down relatively to the arm c and tension-lever e .

The operation of the mechanism may be further regulated, however, by loosening the set-screw c^3 and changing the relative direction of the arm c and lever e , or in the case of the device illustrated in Fig. 6 the relative

angle of the worm-sector g' and the lever g may be varied, as desired, by loosening the bolt g^3 .

The tension is under absolute control by means of the nuts f^2 , bearing against the tension-springs, and also by reason of the capability of shifting the free end f of the tension device toward or from the fulcrum-pivot of the lever e .

10 If it is desired to set the machine so that it will be impossible for the steam-valve to be opened or closed beyond a certain fixed limit, it may be accomplished by shifting the arm f^8 slightly relatively to the bracket a , so as to
15 change the position of the spur d^2 relatively to the stops formed by the respective walls of the slot f^{12} . This same object may be attained in the form illustrated in Figs. 5 and 6 by changing the position of the worm-sector
20 g' relatively to the spur c^4 . For some purposes also it is desirable to vary the amplitude of swing of the guide-roll c' in order to permit a greater or less degree of stretching of the fabric being dried, and provision for
25 this is made by moving the bearings c' longitudinally of the arm c , as shown in Fig. 2.

While I have herein shown and described the preferred forms of my invention, yet I do not limit myself to the present embodiment
30 thereof, inasmuch as many changes may be resorted to without departing from the spirit and scope of my invention.

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

1. In a drying-machine or the like, a swinging arm, a guide-roll journaled thereon, a swinging valve-controlling lever adapted to control by its movement the steam-supply of
40 the machine, and means to cause said arm and said lever to swing together in unison, whereby the lever receives positive and definite movement corresponding to the movements of the arm and roll, and means for changing,
45 at will, the angle of said arm and lever relatively the one to the other, substantially as described.

2. In a drying-machine or the like, a swinging arm, a guide-roll journaled thereon, a swinging valve-controlling lever adapted to control by its movement the steam-supply of
50 the machine, means to cause said arm and said lever to swing together in unison, whereby the lever receives positive and definite movement corresponding to the movements of the arm and roll, and hand-operated means
55 for adjusting the position of the said lever relatively to the said arm, for varying the regular normal swing thereof, substantially as described.
60

3. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally mounted thereon, a guide-roll journaled on
65 said arm, a valve-controlling lever also pivotally mounted on said bracket and constituting with said arm substantially a bell-crank, and adapted to control the steam-sup-

ply of the machine, and a suitable adjusting device connecting the arm and lever for changing the angular relation of the two at
70 will, substantially as described.

4. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally mounted thereon, a guide-roll journaled on
75 said arm, means for adjusting said roll longitudinally of said arm, a valve-controlling lever also pivotally mounted on said bracket and constituting with said arm substantially
80 a bell-crank, and adapted to control the steam-supply of the machine, and a suitable adjusting device connecting the arm and lever for changing the angular relation of the two at will, substantially as described.

5. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally
85 mounted thereon, a guide-roll carried by the arm, a tension-lever mounted independently of said arm and adjustable relatively thereto on said bracket, means to rigidly connect the
90 arm and tension-lever together, a tension device connected to the tension-lever, and a valve-controlling lever also mounted on said bracket and constituting with said arm substantially a bell-crank, and adapted to control
95 the steam-supply of the machine, substantially as described.

6. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally mounted thereon, a guide-roll carried by the
100 arm, a tension-lever mounted on the bracket, a tension device connected at one end to the tension-lever, an arm adjustably secured to the bracket and supporting the other end of the tension device, a valve-controlling lever
105 mounted on the bracket and constituting with said swinging arm substantially a bell-crank and adapted to control the steam-supply of the machine, and means to adjust on said bracket all of said other mentioned parts, sub-
110 stantially as described.

7. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally mounted thereon, a guide-roll carried by the
115 arm, a tension-lever mounted on the bracket, a tension device connected at one end to the tension-lever, a valve-controlling lever pivotally mounted on the bracket and adapted to control the steam-supply of the machine, and an adjusting device, one member of
120 which is arranged to be rigidly connected to said arm and the other member of which is arranged to be rigidly connected to said valve-controlling lever, said two members being relatively movable by means of a hand-wheel
125 and gear mounted on one member and cooperating parts on the other member, substantially as described.

8. In a drying-machine or the like, a supporting-bracket, a swinging arm pivotally
130 mounted thereon, a guide-roll carried by the arm, a tension-lever mounted on the bracket, a tension device connected at one end to the tension-lever, a valve-controlling lever pivotally mounted on the bracket and adapted

to control the steam-supply of the machine,
and an adjusting device, one member of
which is arranged to be rigidly connected to
said arm and the other member of which is
5 arranged to be rigidly connected to said valve-
controlling lever, said two members being
relatively movable by means of a hand-wheel
and gear mounted on one member and coöp-
erating parts on the other member, and
10 means to shift the position of either or both

of said members relatively to their said rigid
connections, substantially as described.

In testimony whereof I have signed my
name to this specification in the presence of
two subscribing witnesses.

PETER DILLON.

Witnesses:

HENRY C. KING,

GEO. H. MAXWELL.