

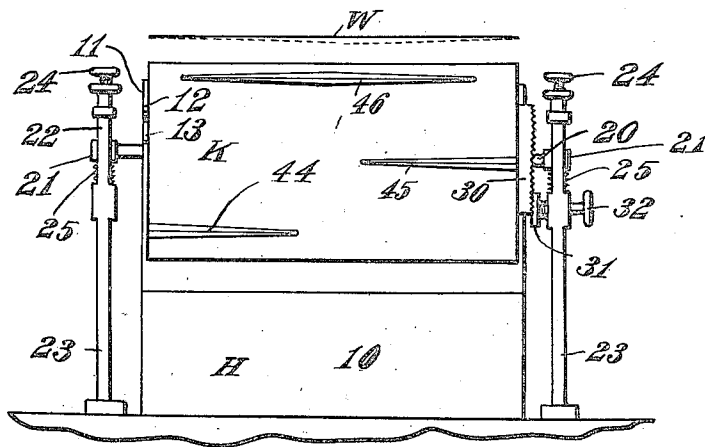
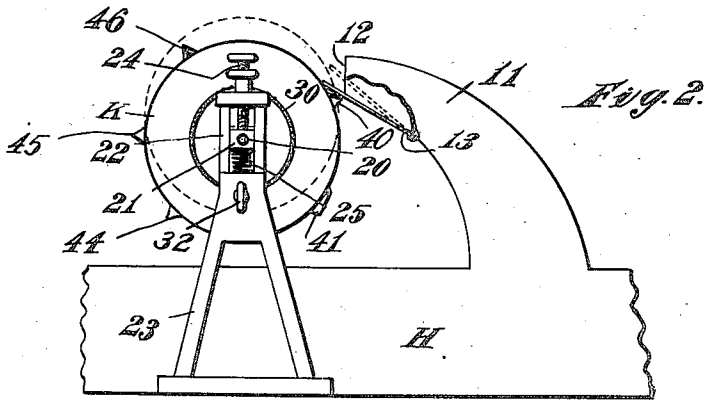
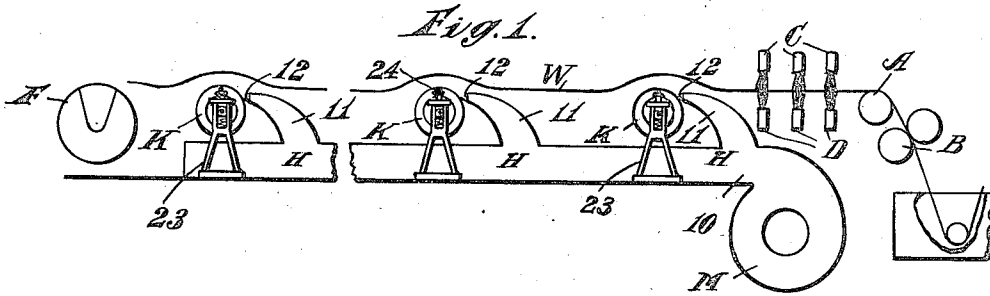
A. T. BRYANT.
DRYING MACHINE.

APPLICATION FILED JAN. 23, 1915.

1,154,560.

Patented Sept. 21, 1915.

3 SHEETS—SHEET 1.



WITNESSES:

Sidger H. Wood.
Vera J. Duruau.

INVENTOR.

A. T. Bryant.
BY
Gardner W. Pearson
ATTORNEY.

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Fig. 4.

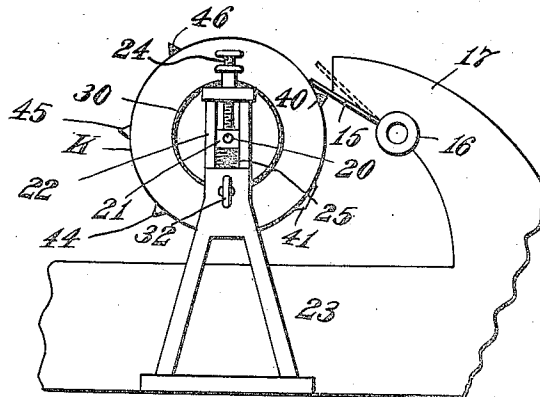
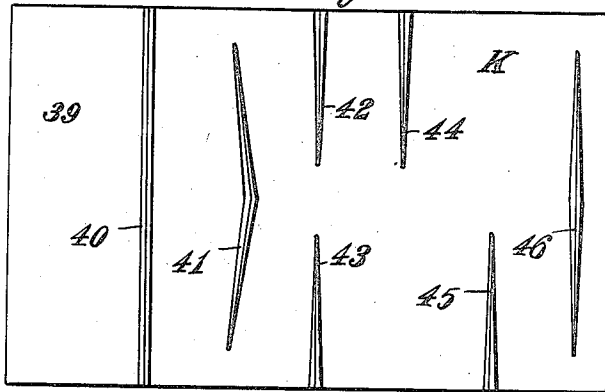


Fig. 5.

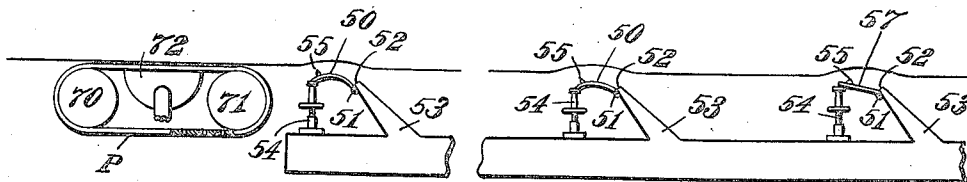


Fig. 6.

WITNESSES:

Ludger A. Nicol
Kora J. Lurman

INVENTOR.

Asa C. Bryant,
 BY
Gardner W. Pearson
 ATTORNEY.

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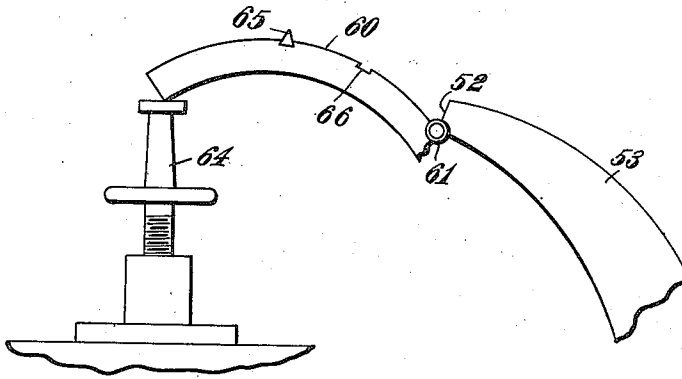


Fig. 7.

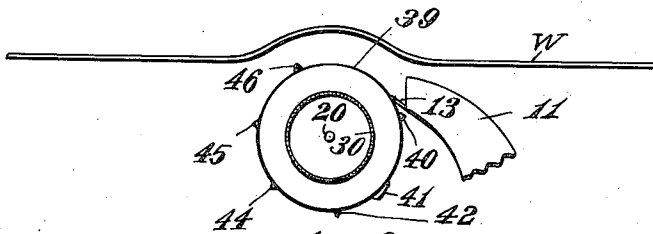


Fig. 8.

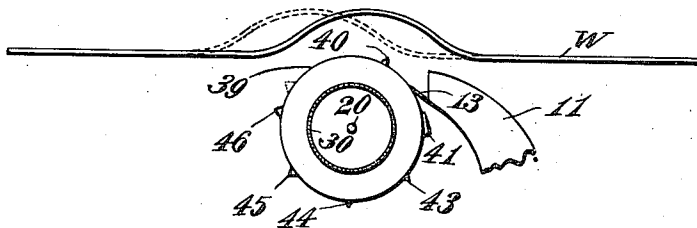


Fig. 9.

WITNESSES:

Frederick A. Nicol
Wm. J. Sullivan

INVENTOR.

Asa T. Bryant,
 BY
Gardner W. Pearson
 ATTORNEY.

UNITED STATES PATENT OFFICE.

ASA T. BRYANT, OF LAWRENCE, MASSACHUSETTS.

DRYING-MACHINE.

1,154,560.

Specification of Letters Patent.

Patented Sept. 21, 1915.

Application filed January 23, 1915. Serial No. 4,004.

To all whom it may concern:

Be it known that I, ASA T. BRYANT, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Drying-Machines, of which the following is a specification.

This invention relates to means for supporting relatively long webs or strips of material and it is particularly applicable to mechanism for drying such webs or strips.

My device is especially useful for supporting long relatively weak webs of material by means of a series of pneumatic cushions or air blasts. Its particular purpose is to so regulate these air blasts that the material will be supported entirely by the air and will never touch any solid part until it has reached its point of destination. The differences in the air blasts, the different tension on the web at the ends and in the middle on account of the force of gravity, the slight variations in the material itself tend to cause such a web to sag at the sides or the center, sometimes to such an extent as to permit it to strike the mechanism underneath.

My device is particularly useful in connection with the drying of glazed paper by hot air blasts and in the drawings I show its application to such a purpose. In the manufacture of such paper it is highly important that the smooth, glazed surface should never be scratched or marred. Its glazing is especially susceptible to such injuries until it is thoroughly dried out. For the purpose of drying, it comes from the coating machine and is delivered over a plurality of hot air blasts running sometimes a distance of 80 or 90 feet to a receiving roll which is usually of the suction type to provide the necessary tension.

My device is particularly useful in connection with the manufacture of paper which is glazed or otherwise coated on both sides, as with such paper, the bottom of the web must be dried enough between the delivery roll of the coating means and the receiving roll or apron so that it will not stick to nor be blurred by such roll or apron nor by the bars of the drying racks over which it is looped. The top must be dried enough so that it will be set and will not run, at the same time.

To control the web of paper, a series of

air blasts from above in connection with a series of air blasts from below have been used, but I find that it is not necessary to use the air blasts from above with my device. Such overhead air blasts are expensive and difficult to regulate.

The overhead pipes accumulate dust which drops on the paper making defects; the air blasts must be very finely adjusted or else they blow the web down upon the underneath mechanism; and the paper has a strong tendency to rock.

I have discovered that a properly directed and regulated series of air blasts from below will control the web and do the work desired.

With my machine, I use a series of ducts the mouths of which open under the plane between the delivery and receiving means at a point which will be a little below where it is desired that the web of paper should run. Through these ducts and mouths, a blast of preferably hot air is blown by suitable means. If the surface of the paper touches the top of one of these ducts, it is not only scratched but leaves a small piece of material. If this occurs a number of times, the accumulated material is finally picked up by the paper and carried along through the calendar rolls by which it is squeezed out forming a blemish.

I find that it is desirable to not only regulate the volume and direction of each air blast, but also its course until it has become dissipated. If there is nothing under each air blast, there is a tendency to blow the paper too high and to get it out of control. I find also that if the mouth of the duct is too near the floor, results are not satisfactory, as the web rolls and is uncontrollable.

I find that it is desirable to use deflecting means which extend from closely below the mouth of each duct forward under the air blast a little distance. Such means seems to prevent the still air of the surrounding atmosphere from being carried along with the blast and tends to hold down the blast and also the web above it. Such a deflecting means is the principal feature of my invention and its purpose is to limit and control the upward movement of the paper caused by the blast of air. It consists in general of deflecting means preferably located below the mouth of each duct and of a curved form. I prefer to provide each deflecting means with one or more deflecting battens

which extend along said means a greater or less distance and parallel with the mouth of the adjoining duct.

In the drawings, Figure 1 is a side elevation of a drying machine equipped with my device. Fig. 2 is a detail side elevation of a single drying and supporting member. Fig. 3 is a front elevation thereof. Fig. 4 shows the developed surface of a deflecting cylinder. Fig. 5 shows a modification of the duct mouth. Fig. 6 shows a side elevation of a modified form of deflecting means. Fig. 7 is a detail side elevation of a preferred form of shelf. Figs. 8 and 9 are diagrams illustrating the effect of different deflecting surfaces upon the web.

In the drawings, A and B represent the delivery rolls, C and D the brushes and F the suction receiving roll all of a well known construction in paper coating machines and W represents the web of paper.

Located at points between the delivery and receiving mechanism under the web of paper W and at substantially equal intervals are the supporting and drying members indicated in Fig. 1 by H. These drying members H, H are preferably connected by a hot air conveyer 10 which runs along under them and is connected with means such as blower M for blowing air, preferably hot air, through them. This is one of the air conveying ducts and from it upwardly extend one or more other air ducts 11, 11. Each of these is as wide as the web to be dried or it may be wider. Each terminates in a mouth 12 which is in proximity to and under a plane between the delivery and receiving mechanism, that is under a plane such as the web of paper would occupy if it did not sag and if it was of sufficient strength. The mouths of these ducts are of such width as to extend the full width of the web of paper.

I prefer to pivot the lower member of each duct 11 behind the mouth thereof as shown at 13 in Fig. 2 forming a lower lip which can be opened or closed to permit more or less air to pass out of the mouth. This may be omitted, however, in which case the mouth cannot be altered in size.

As stated, there is a tendency for the web to sag at different points and to correct this tendency, I prefer to employ the deflecting cylinder K which I will describe. This cylinder K may be solid or hollow but I prefer to make it of sheet metal on account of lightness. It is revoluble on a shaft 20 mounted in bearings 21 which are preferably slidable vertically in yokes 22 carried by standards 23. By means of set screws 24 and compression lifting springs 25, the cylinder may be raised or lowered at will.

I prefer to mount an annular ring 30 at one end and to form its outer edge with notches for the reception of a tooth 31 car-

ried by a spring actuated plunger 32 whereby when the cylinder K is rotated, it may be locked in place by engaging the tooth 31 with an adjoining notch in ring 30. I prefer to locate this deflecting cylinder with reference to the mouth of the adjoining duct so that the free edge of the lip 13 will rest upon it, whereby as it is raised and lowered such lip will be closed and opened.

On the surface of cylinder K as shown in Fig. 4, I place one or more deflecting battens 40, 41, 42, 43, 44, 45, 46. These extend lengthwise of cylinder K parallel with the mouth of the adjoining duct and may be of varying shapes to serve varying purposes. Whichever batten is brought in front of the mouth of the blower will deflect the air blast in a particular way with the result that the web of paper which passes over it will receive more of the force of the blast at one point than at another. In using this cylinder, if the paper sags in the middle, the batten 46 which forms a ridge higher at the center than at the end is brought around by revolving the cylinder to a position in front of the blower mouth, with the result that the air at the center is directed upward more forcibly than at the ends, whereby the central sagging tendency is overcome.

In Fig. 3, the dotted lines show the web as it centrally sags before 46 is brought up. If the sagging is at one side or the other, either batten 45 or 44 is brought into position with the result of lifting whichever side is desired. If both sides sag, battens 42 and 43 are brought into position, while if, as sometimes happens there is a tendency to wrinkle or loop in the center, the plow shaped batten 41 is brought into position and so directs the air blast as to smooth out the wrinkles.

Under good conditions of stock and machinery, none of the battens need to be in operative position but the smooth surface 39 is turned to such a position that the air blast impinges upon it as shown in Fig. 8. The web in such case should keep down in a steady position concentric with the surface of the deflecting means. If the web is running too close to the cylinder or duct, as shown by the dotted lines in Fig. 9, batten 40 is brought into position. This will cause the web to be lifted as shown by the full lines. If the web is heavy, the cylinder is lowered, carrying with it lip 13 whereby more air is permitted to pass through the duct mouth and the web is kept up. It should not be lowered enough however to allow air under pressure to escape between the sides of the lip and of the mouth.

It is preferable that the lower lip such as 13, if one is used, or the lower edge of the mouth, if one is not used, should rest upon a section of the deflecting cylinder surface which is smooth rather than upon a batten

as thereby no opening is left between the mouth and the cylinder through which the adjoining still air may be drawn to disarrange the work. In Fig. 5, however, I show a construction wherein the mouth of duct 17 has a lower lip 15 which is pivoted and can be regulated independently of the cylinder K by means of the friction hand nut 16. In adjusting this lower lip, hand nut 16 is loosened, and the lip is brought into the desired position after which hand nut 16 is tightened and holds it in place. Any other adjusting means may be used.

In Fig. 6, I show a construction which may be used in place of the deflecting cylinder if desired, although it is not as convenient nor as effective as the cylinder. In this construction, the revoluble deflecting cylinder is replaced by a shelf 50 which is somewhat curved or by a shelf 57 which may be flat both preferably respectively pivoted at 51 to the lower front edge of a mouth 52 of an air duct 53 as shown. I find that better results are obtained by using a curved shelf than flat shelf but the flat shelf may be used. I prefer to support the free end of such a shelf 50 or 57 adjustably by means of legs 54 which may be formed with screw threads and an adjusting wheel as shown. Any other adjusting means may be used. I find it desirable to use on each shelf a deflecting batten such as 55 which may be permanently fixed thereto. Preferably, however, where I use a shelf construction, I make the shelf as shown in Fig. 7 at 60 in the form of the section of a cylinder surface pivoted at one straight edge 61 to the lower front edge of a mouth 52 of a duct 53. This shelf is preferably adjustable by means of a leg 64 and has one or more suitable ways 66, 68 into which from the side may be slid battens such as 65 of varying lengths and forms.

By means of my deflecting means such as the pivoted shelf or revoluble cylinder, especially one which is vertically adjustable and with or without fixed or removable battens, the force of the air blasts at different points on the web may be regulated by the adjustment of shelf or cylinder, and by the location and arrangement of the battens such as 40 or 65.

The amount of air which leaves the duct mouth may or may not be capable of regulation by means of an adjustable lower lip such as 13 or 15. All or any of these deflecting, or regulating means may be used and the web is supported by what amounts to an adjustable pneumatic cushion.

Vertical air blasts which struck the web at right angles could probably not be regulated by my devices and I regard it as essential that each air blast from an air delivery duct should strike such web at an angle. It is evident that my device may be used in connection with any kind of web

which is to be dried or which is to be supported. In adjusting the revoluble cylinder, it should be turned forward so that the top will move in the direction of the movement of the web and not against it and it is very desirable, if not necessary in adjusting, that the adjustment should be made while the web is moving and the air blasts are blowing.

It will be observed that there are no sides to my machine and that the air from the ducts can therefore escape at the sides.

In Fig. 6, the receiving means is shown as a suction apron P which is perforated and travels over rolls 70 and 71 and a box 72 from which the air is continually exhausted. This is a well known construction.

I claim:

1. In a machine for drying paper having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under a plane between the delivery and receiving mechanism, with means for blowing air through said ducts, and curved deflecting means adjoining and below the mouth of each duct.

2. In a machine for drying paper having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under a plane between the delivery and receiving mechanism, with means for blowing air through said ducts, and curved deflecting means adjoining and below the mouth of each duct together with one or more deflecting battens attached to each deflecting means.

3. In a machine for drying a web having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under the web, with means for blowing air through said ducts, and adjustable deflecting means adjoining and below the mouth of each duct, together with a pivoted adjustable lower lip for each mouth.

4. In a machine for drying paper having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under a plane between the delivery and receiving mechanism, with means for blowing air through the mouths of said ducts, and a revoluble deflecting cylinder which carries one or more battens of different forms adjoining and below the mouth of each duct.

5. In a machine for supporting a web having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under said web, with means for blowing air through the mouths of said ducts, and a vertically adjustable revoluble cylinder adjoining and below the mouth of each duct,

each cylinder having on its curved surface one or more battens of different forms.

6. In a machine for supporting a web having delivery and receiving mechanism, the combination of one or more air delivery ducts having mouths in proximity to and under said web, with means for blowing air through the mouths of said ducts, and a vertically adjustable revoluble cylinder adjoining and below the mouth of each duct, each cylinder having on its curved surface one or more battens of different forms, together with a lower lip for each duct mouth which rests upon a cylinder and is pivoted behind said mouth as described.

7. In a machine for supporting a web having delivery and receiving mechanism, the combination of means for creating one or more air blasts underneath and at an angle with said web, with a vertically adjustable revoluble cylinder adjoining and below each air blast, each cylinder having on its curved surface one or more battens of different forms.

In testimony whereof I hereto affix my signature in presence of two witnesses.

ASA T. BRYANT.

Witnesses:

JOSEPH L. HOYLE,
HARRY R. LAWRENCE.