April 21, 1925. 1,534,854

A. LEWIS

SUCTION BOX AND COVER THEREFOR FOR USE IN FOURDRINIER MACHINES

Filed May 12, 1923 2 Sheets-Sheet 1

Fig. 1

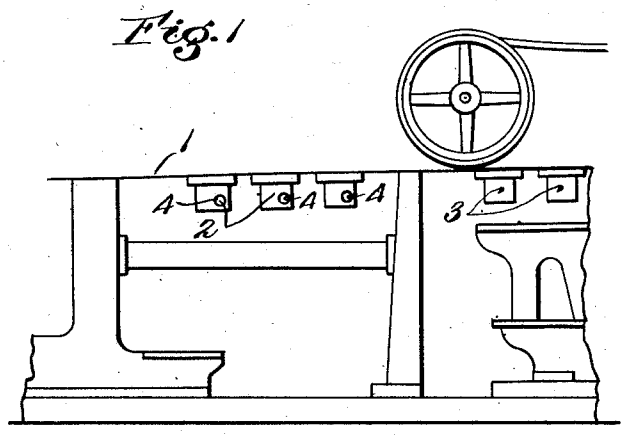


Fig. 5

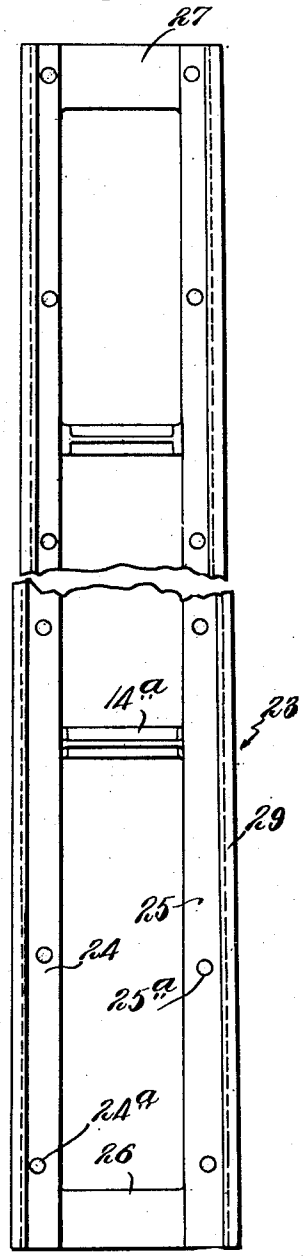


Fig. 2

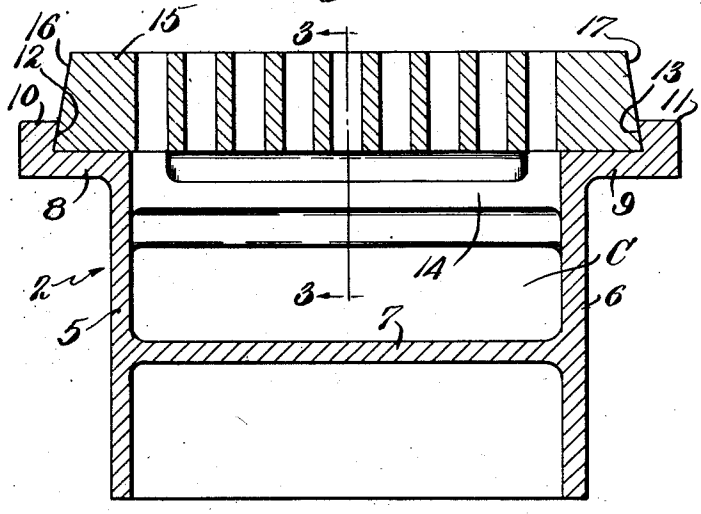


Fig. 3

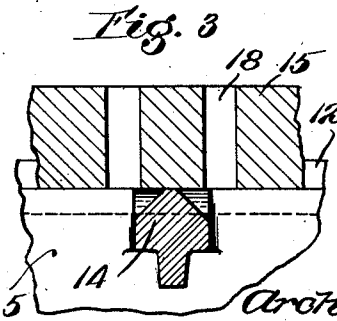
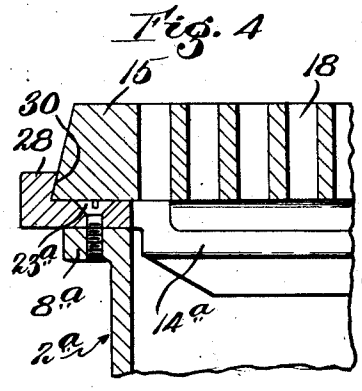


Fig. 4



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Filed May 12, 1923 2 Sheets-Sheet 2

Fig. 6

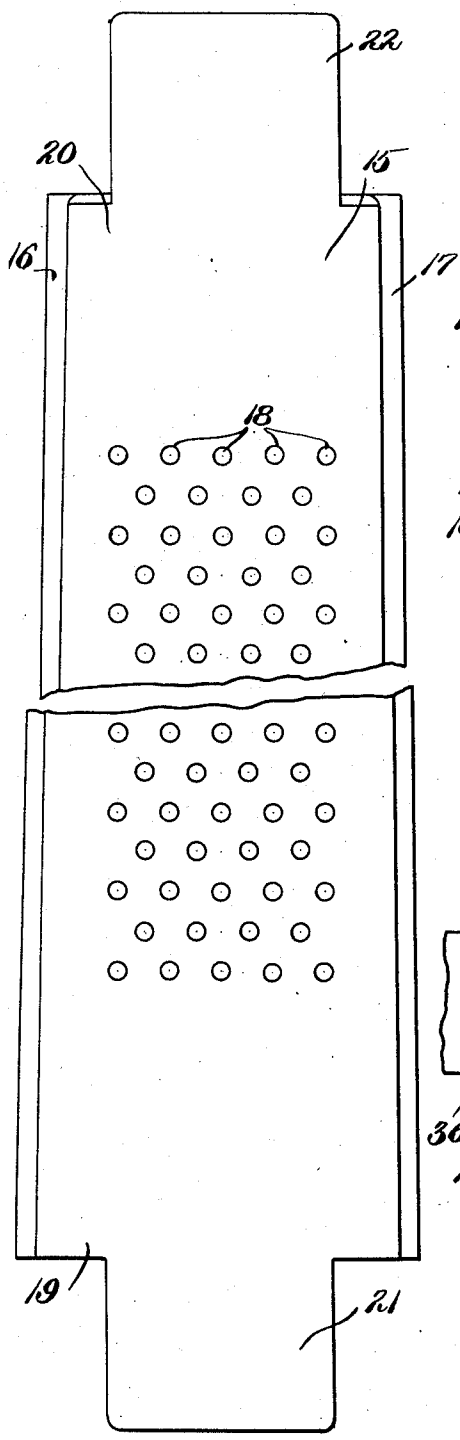


Fig. 8

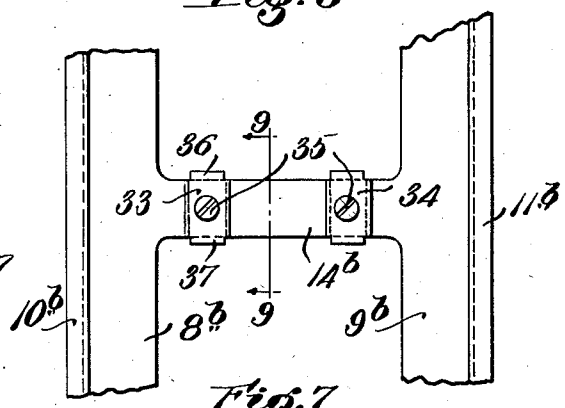


Fig. 7

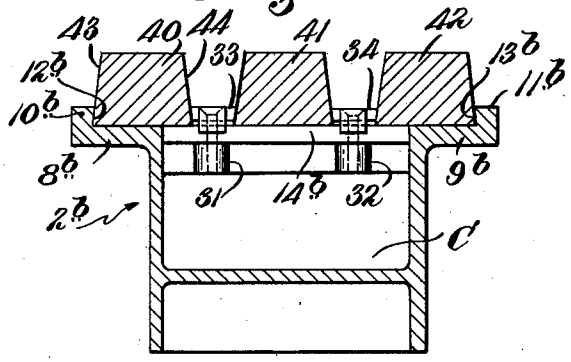


Fig. 9

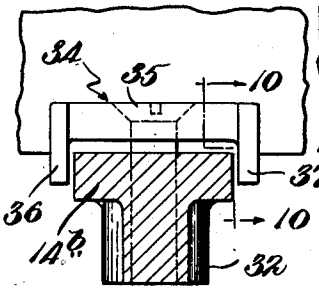
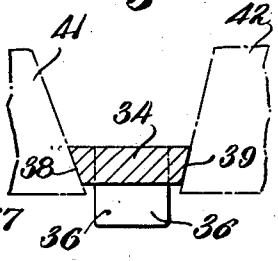


Fig. 10



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Patented Apr. 21, 1925. 1,534,854

UNITED STATES PATENT OFFICE.

ARCHELAUS LEWIS, OF CUMBERLAND MILLS, MAINE.

SUCTION BOX AND COVER THEREFOR FOR USE IN FOURDRINIER MACHINES.

Application filed May 12, 1923. Serial No. 638,610.

To all whom it may concern:

Be it known that I, ARCHELAUS LEWIS, citizen of the United States of America, and resident of Cumberland Mills, in the county of Cumberland and State of Maine, have invented new and useful Improvements in Suction Boxes and Covers Therefor for Use in Fourdrinier Machines, of which the following is a specification.

This invention pertains to paper making machines of the Fourdrinier type and relates more particularly to improvements in suction boxes forming essential elements of such machines.

These suction boxes, of which several are usually employed, are located at the couch end of the machine and are spaced beneath the horizontal run of the Fourdrinier wire just before the latter dips over the guide roll to the couch. These suction boxes extend transversely across the machine and are provided with perforated or slotted covers. The boxes are connected with a suction pump or pumps which maintain a partial vacuum in the boxes and as the wire with its film of paper travels over the tops of the boxes a portion of the water contained in the paper is sucked out into the suction boxes. The partial vacuum within the box tends to hold the wire against the cover of the box with considerable pressure and as the wire is constantly moving transversely of the width of the box it soon wears grooves in the cover to such an extent as to permit air to enter the box from beneath the wire thus decreasing the suction through the wire and impairing the efficiency of the box.

It is therefore customary to make the box covers of wood or similar material and as often as appears necessary these covers are removed and their upper surfaces planed down to eradicate the grooves after which the covers are replaced for further use. Ordinarily the covers are secured to the box by means of countersunk screws and as the covers are operatively positioned immediately below the wire and in contact therewith, the only practical mode of resurfacing the cover is to remove the box bodily from the machine. These boxes are very heavy and it requires several men to perform this operation, and after the box has been removed from the machine the cover must be removed and carried to a planing machine or else planed down with hand planes while still secured to the box. Either method consumes so much time that it is common to shut down the machine during the operation in order to avoid impairing the quality of the paper.

The principal object of the invention is to provide an improved type of cover, together with retaining means therefor, of such character that the cover may be withdrawn from beneath the wire without disturbing the box and with a minimum consumption of time, and so designed that when the cover is in operative position upon the box it makes a close and air-tight joint therewith without necessitating the employment of screws, bolts or similar means for securing it in position.

To this end the box is provided with upstanding flanges at its opposite sides having dovetailed or undercut grooves in their inner edges and preferably these flanges are somewhat farther apart at one end of the box than at the other. As applied to a new box such flanges would ordinarily be formed integrally therewith, but when the present invention is to be applied to an old style box the flanges are formed upon a frame which is secured to the box by screws entering the holes ordinarily provided for receiving the cover retaining screws.

The cover proper consists of a perforated plank having its longitudinal edges beveled to fit the dove-tailed grooves in the flanges and this cover tapers in width from one end to the other to correspond to the varying distances between the flanges. Such a cover may be slid endwise onto the box from that end where the flanges are farthest apart and may be securely wedged in operative position with its edges making a close and air-tight joint with the respective flanges by striking a light blow or blows upon the wider end of the cover. When it is necessary to remove the cover for resurfacing, it may be loosened by tapping its narrow end and then withdrawing it longitudinally from the box without disturbing the latter. An extra cover having its surface properly prepared may, if desired, be slipped immediately into place on the box and the operation of the machine need not be interrupted or interfered with during the resurfacing of the worn cover. If, instead of a perforated cover, it be desired to employ one having longitudinal slots, it is proposed to substitute for the single cover member a series of bars each having beveled edges

and preferably tapered from end to end in the same manner as the cover heretofore described and in addition to the side flanges, the box is provided with grooved or undercut clips or retainers at intervals transversely of its width to engage the edges of the bars and hold them in operative position.

In the accompanying drawings a preferred embodiment of the invention is illustrated by way of example and in such drawings:—

Figure 1 is a fragmentary side elevation to small scale showing a portion of the couch end of a Fourdrinier machine and indicating the position of the suction boxes therein;

Figure 2 is a transverse vertical section to larger scale illustrating an improved suction box and one type of cover in accordance with the present invention;

Figure 3 is a fragmentary longitudinal section of the box of Fig. 2 on a line 3—3 of the latter;

Figure 4 is a fragmentary vertical cross section similar to Fig. 2 but showing the improved cover and holding means therefor as applied to the old form of box;

Figure 5 is a fragmentary plan view showing a cover holding frame such as is employed with the old form of box for securing the new type of cover thereto;

Figure 6 is a fragmentary plan view of a cover embodying the present improvements;

Figure 7 is a transverse vertical cross section, similar to Fig. 2 but to smaller scale, showing the invention as applied to that form of cover which comprises a series of spaced bars;

Figure 8 is a fragmentary plan view of a box of the improved type arranged for use with a slotted cover such as shown in Fig. 7;

Figure 9 is a fragmentary vertical cross section to larger scale, on the line 9—9 of Fig. 8, showing details of a bar holding clip; and

Figure 10 is a vertical cross section on the line 10—10 of Fig. 9 showing further details of such clip.

In Fig. 1 the numeral 1 indicates substantially the plane of the Fourdrinier wire while 2, 2 indicate the suction boxes arranged immediately beneath such wire and over which the latter travels. These boxes are connected by means of conduits 4 with a vacuum pump or pumps so that a reduced pressure is maintained within such boxes in the usual manner. Referring more particularly to Fig. 2 with the boxes 2 shown as comprising the side walls 5, 6, and the bottom walls 7, the upper edges of the side walls are furnished with outstanding horizontal flanges 8, 9 respectively shown as integral with the box and the outer edges of these flanges are thickened to provide the upstanding flanges 10, 11 respectively. The inner edges of the flanges 10, 11 are undercut to provide the beveled surfaces 12, 13 respectively at intervals longitudinally of the box. Cross bars or brace members 14 are provided serving as supports for the cover 15. This cover is preferably formed from a plank and has downwardly flaring inclined or beveled edges 16, 17. The cover is also provided with a plurality of perforations or openings 18 which communicate with the chamber C within the box and in which low pressure is maintained as above pointed out.

Preferably one end 19 of the cover is wider than the opposite end 20, the cover tapering gradually from the wider toward the narrower end. The flanges 10, 11 of the box are also farther apart at one end of the box than at the other corresponding to the taper of the cover. Preferably an ear or lug 21 is provided at the wider end 19 of the cover while a lug 22 projects from the narrower end of the cover. In putting the cover in place upon the box, its narrower end is placed between the flanges 10, 11 at that end of the box where such flanges are most widely spaced apart and the cover is then slid longitudinally of the box until its beveled edges 16, 17 become wedged between the inner surface 12, 13 of the flanges 10, 11. One or more light blows may now be struck against the end of the lug 21 so that the cover becomes firmly and securely wedged in position where it makes a close and air-tight fit with the box. When it is desired to remove this cover, light blows may be struck against the outer end of the lug 22, thus loosening the cover and permitting it to be withdrawn freely from the box. While the tapering form of cover is preferred, it is clear that many of the advantages of this form of cover may be secured even though the cover be of uniform width from end to end with a corresponding arrangement of the retaining flanges.

Referring to Figs. 4 and 5, the new form of box is indicated generally at 2^a, such box being provided with outstanding horizontal flanges at its upper edges as indicated for example at 8^a. For use with this type of box an open lug frame 23 is provided. This frame comprises the side members 24, 25, which are adapted to rest upon the upper surface of the flanges 8^a and the end members 26, 27. The side members 24, 25 are furnished with upstanding flanges 28, 29 respectively whose inner faces are undercut as indicated at 30 to provide dovetailed grooves extending longitudinally of the frame. These grooves slidably engage the edges of the cover members 15 in the same manner as above described. If such cover members be of tapering form, the flanges 28, 29 are spaced apart a greater distance at

one end of the frame than at the other, such an arrangement being shown in Fig. 5 wherein the flanges are shown as farther at the end 26 of the frame than at the end 27. For strengthening the frame and for supporting the cover at intermediate points, a series of braces 14^a is provided. Longitudinal members 24, 25 of the frame are furnished with openings such as 24^a, 25^a respectively for the reception of screws 23^a which engage threaded openings usually provided in the flanges 8^a of the suction box for the reception of the screw ordinarily employed in securing the cover to the box. In the modified arrangement shown in Figs. 7 to 10 inclusive, the box 2^b is shown as having the outstanding integral flanges 8^b, 9^b respectively in the same manner as shown in the box in Fig. 2. The outer edges of these flanges are furnished with upstanding flange members 10^b, 11^b respectively whose inner edges are undercut at 12^b, 13^b, to provide cover engaging grooves. A series of brace members 14^b are arranged at intervals longitudinally of the box and each of these brace members is preferably provided with one or more bosses such as 31, 32 having internally screw threaded bores. Upon each of the brace members 14^b cover retaining clips such as 33, 34 are arranged, each clip corresponding in number to the bosses just referred to. These clips are preferably brass with downwardly extending ears 36, 37 embracing the sides of the brace members for centering the clips thereon, and the clips are secured to the brace members by means of screws 35 to engage the threaded openings in the bosses. The opposite edges of the clips are undercut as indicated at 38, 39 to provide cover engaging elements. In this form of the device the cover comprises a plurality of spaced longitudinally extending bars of which three are herein disclosed, such bars being indicated by the numerals 40, 41, 42 respectively. The opposite edges of such bars are beveled as indicated at 43, 44 to interfit with the undercut surfaces of the flanges of the box and of the retaining clips respectively as indicated in Fig. 7. The bar 40 engages the surface 12^b of the flange 10^b and one of the undercut edges of the clip 33. The bar 41 is disposed between the clips 33, 34 while the bar 42 engages the clip 34 and the flange 11^b. These bars may be applied individually by sliding them longitudinally of the box. Preferably the bars are tapered from one end to the other in the same manner as the cover member previously described and the flanges 10^b, 11^b and the clips 33, 34 are so disposed as to fit snugly the edges of the several bars when the latter are in operative position.

Whether the cover be formed as a single element as shown in Fig. 6 or as a plurality of separate elements as shown in Fig. 7, it will ordinarily be made of sufficient thickness to permit of its being resurfaced several times before it must be discarded. With the improved arrangement herein shown for holding the cover member or members in position, it is clear that such member or members may be planed down very rapidly without in any manner interfering with the action of the securing means. When the cover is secured to the box by means of screws as is the usual custom, it is necessary to countersink such screws in order to prevent their engagement with the wire and the holes formed in the cover above the screw heads apparently increase the tendency of the cover to become grooved or worn by the action of the wire, while with the present arrangement no openings are necessary for securing the cover in position and thus such added wear is eliminated. If the cover be made without taper, it may be found desirable to provide bolts, latches, or other means for preventing longitudinal movement of the cover, but it is evident that such means may be located at the end of the box where they would be readily accessible without interfering with the wire so that the removal of the cover would present no substantial difficulties and could be accomplished without interference with the operation of the machine. While in Fig. 7 the slotted cover is shown as applied to a box having integral flanges, it is contemplated that such a slotted cover might be employed in connection with a frame such as indicated in Fig. 5, it being merely necessary to apply clips to the braces 14^a of such frame to permit the employment of a cover of the type shown in Fig. 7.

I claim:

1. In combination with the suction box of a Fourdrinier machine, a cover member tapering in width from one end of the box to the other.

2. In combination with the suction box of a Fourdrinier machine, a cover member having downwardly flaring edges and tapering in width from one end of the box to the other.

3. A suction box for use with Fourdrinier machines, said box having cover retaining elements, and a slidable cover member tapering in width from one end to the other, engaging said retaining elements.

4. A suction box for use in Fourdrinier machines comprising spaced cover retaining elements, the distance between such elements being greater at one end of the box than the other, and a cover having openings therethrough and comprising means engageable with said elements for retaining the cover in operative position.

5. A suction box for use in Fourdrinier machines comprising members provided with oppositely inclined cover engaging surfaces, said surfaces being spaced further apart at

one end of the box than at the other, and a tapering cover element having sliding engagement with said surfaces.

6. A suction box for use in Fourdrinier machines comprising upstanding flanges at opposite longitudinal edges of the box, said flanges having undercut grooves in the inner faces, the flanges being spaced more widely at one end of the box than at the other, and cover elements engaging the respective grooves.

7. A suction box for use in Fourdrinier machines having a horizontal, outstanding flange at its upper edge, and a frame attachable to said flange and comprising spaced elements provided with means for slidably retaining a cover in position.

8. In combination with a suction box for use in Fourdrinier machines, an open frame adapted to be secured to the top of the box and comprising longitudinally extending upstanding flanges having grooves in their inner edges for engagement with the elements of a slidable cover.

9. In combination with a suction box for use in Fourdrinier machines, an open frame adapted to be secured to the top of the box, said frame comprising longitudinally extending spaced flanges having undercut inner edges for sliding engagement with elements of a cover, said flanges being spaced further apart at one end of the frame than at the other.

10. A cover holding attachment for use with the suction box of a Fourdrinier machine comprising an open rectangular frame having openings for the reception of screws for securing it to the box, upstanding flanges at its opposite longitudinal edges, said flanges having undercut grooves in their inner faces, and a plurality of transverse braces spaced longitudinally of the frame and extending from side to side thereof.

11. A suction box for use in Fourdrinier machines having means for slidably holding a plurality of cover members in transversely spaced relation.

12. A suction box for use in Fourdrinier machines having upstanding flanges at its opposite edges, said flanges having cover engaging elements, supporting means arranged intermediate the width of the box and provided with cover engaging elements, and a cover comprising spaced members secured in operative position by the respective engaging elements.

13. A suction box for use in Fourdrinier machines having a cover comprising a plurality of spaced bars each having bevelled edges, and means carried by the box for slidably engaging said edges whereby to retain the cover in operative position.

14. A suction box for use in Fourdrinier machines having a cover comprising a plurality of longitudinally extending, transversely spaced bars having downwardly flaring sides, and elements carried by the box and having opposed bevelled surfaces for engagement with the flaring sides of the respective bars for holding them in operative position.

15. A suction box for use in Fourdrinier machines having a plurality of braces extending transversely of the width, and a cover retaining clip mounted upon each of said braces, each clip being provided with an undercut bevelled surface for engagement with a cover element.

16. A suction box for use in Fourdrinier machines having a plurality of transverse braces, a plurality of clips mounted upon each brace, each clip having an undercut surface, and a cover element having bevelled edges engaging said undercut surfaces.

17. A suction box for use in Fourdrinier machines having a plurality of supports spaced longitudinally thereof, a pair of clips secured in transversely spaced relation to each support, each clip having undercut edges, flanges upstanding from opposite edges of the box and having undercut inner edges, a bar having bevelled edges slidably secured between the clips of each pair, and a pair of bars each having bevelled edges, slidably secured respectively between one clip of each pair, and the adjacent upstanding flange.

Signed by me at Cumberland Mills, Maine, this fifth day of January, 1923.

ARCHELAUS LEWIS.