Jan. 1, 1929. 1,696,917

A. LEWIS

SUCTION BOX COVER

Filed May 20, 1926 2 Sheets-Sheet 1

Fig. 1

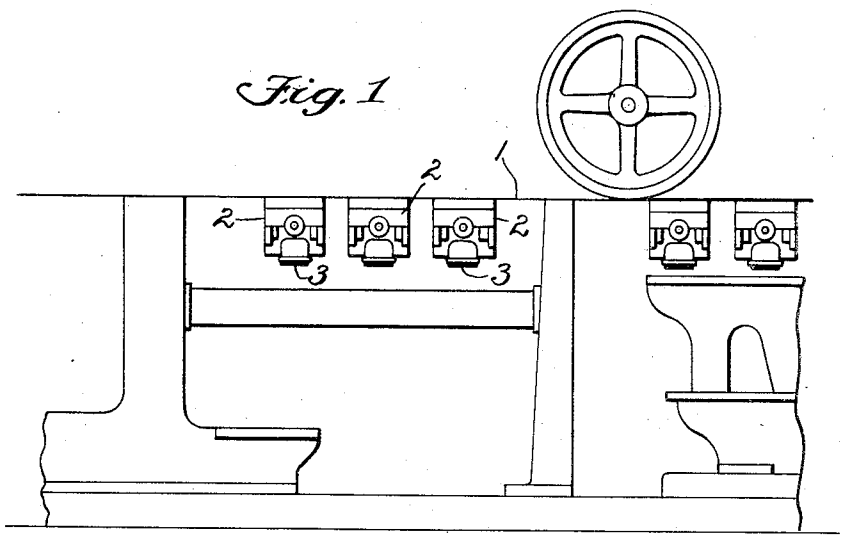
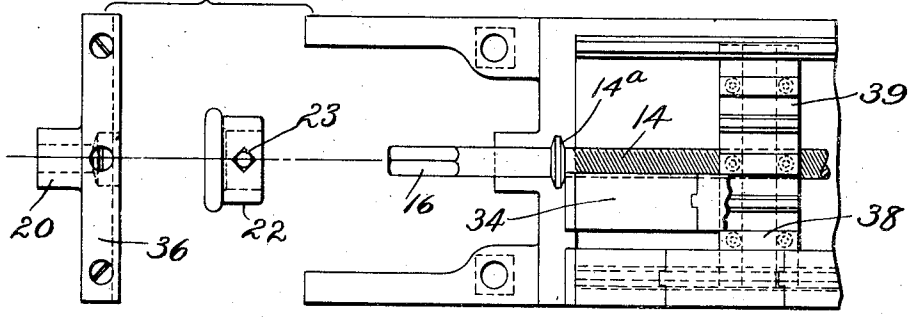


Fig. 2



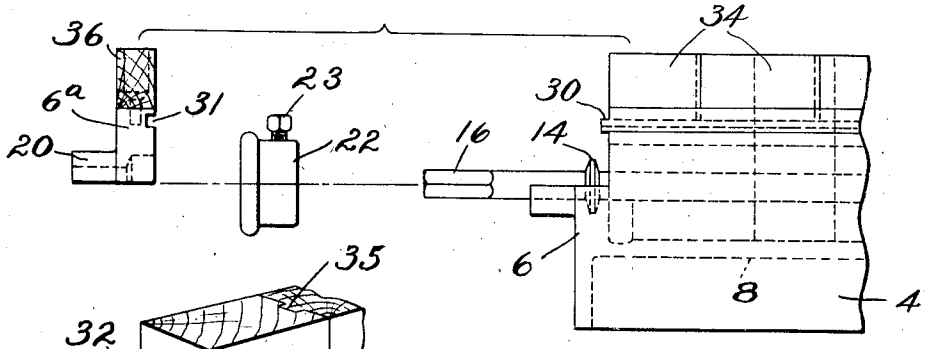


Fig. 3

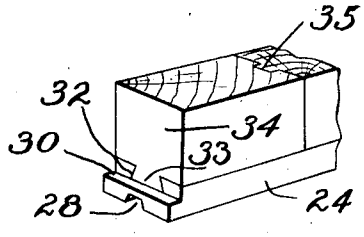


Fig. 4

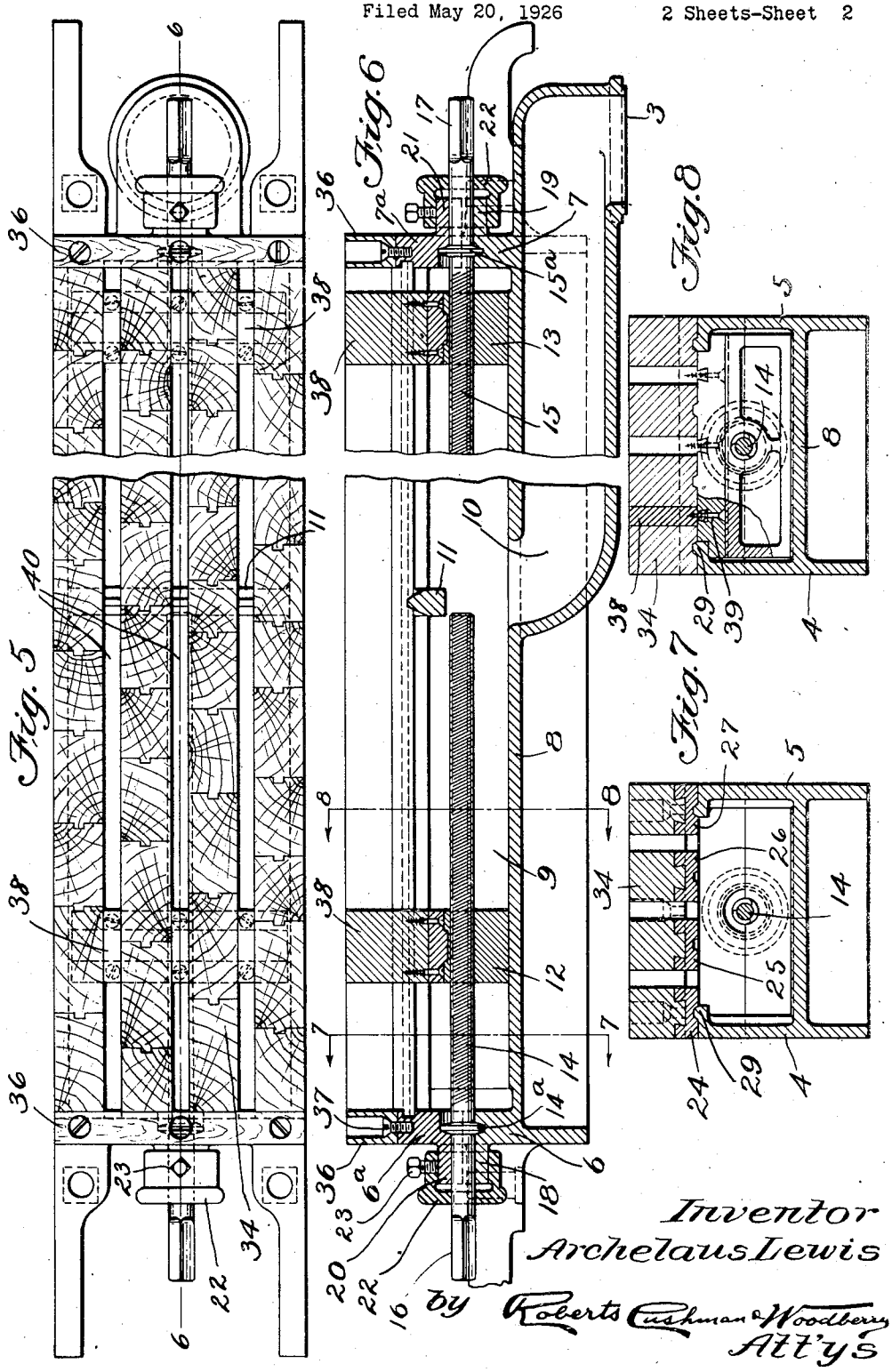
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A. LEWIS

SUCTION BOX COVER

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Patented Jan. 1, 1929. 1,696,917

UNITED STATES PATENT OFFICE.

ARCHELAUS LEWIS, OF CUMBERLAND MILLS, MAINE.

SUCTION-BOX COVER.

Application filed May 20, 1926. Serial No. 110,397.

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.

The 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 other exhaust devices 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 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 and causing defects in the paper web.

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.

In my Patent No. 1,534,854 dated April 21, 1925, I have disclosed an improved type of cover adapted to be removed more easily than covers of usual construction. The object of the present invention is to provide further improvements in the construction of the box cover. Among other things the present improvements provide for rigidly and accurately supporting material of any desired type, for example, wood, rubber, indurated fiber or the like adapted to form the wear surface of the cover over which the wire travels even though such material is incapable of supporting its own weight in the requisite lengths; they provide a rigid cover which will not warp when exposed to moisture; and they permit the use of metal to metal contact surfaces between the box and cover, thus facilitating removal of the cover and at the same time providing accurate and tight joints between the cover and box.

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

Fig. 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;

Fig. 2 is a fragmentary plan view showing one end of one of the suction boxes with a portion of the cover removed or broken away and indicating the cover retaining means removed from the box;

Fig. 3 is a side elevation of the parts shown in Fig. 2;

Fig. 4 is a fragmentary perspective view of one end of one of the cover members;

Fig. 5 is a plan view, partly broken away, of one of the suction boxes with the cover in place;

Fig. 6 is a vertical section substantially on the line 6—6 of Fig. 5;

Fig. 7 is a transverse vertical section on the line 7—7 of Fig. 6; and

Fig. 8 is a transverse vertical section with certain parts broken away substantially on the line 8—8 of Fig. 6.

Referring particularly to Fig. 1 the numeral 1 indicates substantially the plane of the Fourdrinier wire, while the numeral 2 designates certain of the suction boxes disposed immediately beneath the wire and over which the latter travels. These boxes are provided with outlet orifices 3 adapted to be connected by suitable conduits, not shown, to a vacuum

pump or other device adapted to maintain a reduced pressure within the box in the usual manner.

Referring now especially to Figs. 6 to 8 inclusive, each suction box comprises spaced side walls 4 and 5 and end walls 6 and 7 and is provided with a bottom 8. Preferably these walls are made integral, as by casting, so as to avoid joints which might leak. The chamber 9 within the box communicates by means of a passage 10 with the outlet orifice 3. Preferably one or more bridge members 11 extends transversely of the box from one side thereof to the other to assist in supporting the cover intermediate the ends of the latter.

In order that the boxes may be used with webs of different widths I provide sliding partitions 12 and 13 within the box, such partitions resting upon the bottom of the box and having close sliding engagement with its opposite side walls. In order to adjust these partitions toward and from each other so as to vary the effective width of the space 9, I prefer to provide each partition with an internally screw threaded sleeve, such sleeves being adapted respectively to receive the screw threaded shafts 14 and 15. These shafts project out through the end walls of the box and are preferably squared at their outer ends as shown at 16 and 17 respectively for a wrench or other tool by means which the screws may be turned to move the partitions toward and from the ends of the box.

The end walls 6 and 7 of the box are furnished with outwardly projecting bosses 18 and 19 respectively, such bosses providing the lower halves of bearings for the ends of the screw-threaded shafts. The upper halves of these bearings are provided in bosses 20 and 21 respectively carried by removable upper sections 6^a and 7^a of the end walls of the box. In order to hold the removable sections 6^a and 7^a with their bearing bosses in proper assembled relation to the box I provide collars 22 which are slipped over the bearing members 23, 18 and 21, 19, respectively and are secured in position by means of set screws. By removing these collars the end sections 6^a and 7^a may be removed. The shafts 14 and 15 are furnished with radial flanges 14^a and 15^a respectively which limit endwise movement of the shafts.

The cover of the box as constructed in accordance with the present invention comprises a plurality of spaced longitudinally extending composite bars here shown as comprising the base members 24, 25, 26 and 27 respectively. These base members are preferably made of cast iron or other material which does not readily warp or deform when exposed to moisture. Preferably each of these bars, or at least each outermost bar of the series, is provided with a longitudinal groove or slot 28 (Fig. 4) in its lower face. As indicated in Fig. 7 these grooves or slots 28 receive elongate guide members 29 at the upper edges of the side walls 4 and 5 of the box. The members 29 fit in the grooves 28 and provide close and tight joints between the outermost cover members and the side walls of the box while at the same time the metal to metal contact surfaces permit the cover members to be removed readily by sliding them endwise along the top of the box.

While it is not necessary to provide the inner bars, such as the bars 25 and 26, with grooves 28 I prefer to make all of the bars alike so that they may be interchangeable.

Preferably each end of each of the bars of the cover is provided with a projecting flange 30 (Fig. 4) and these flanges are adapted to seat within suitable recesses or slots 31 in the removable end sections 6^a and 7^a of the end walls of the box.

The base member of each of the bars forming the cover is provided, for example, with a longitudinally extending dovetailed slot in its upper surface and these slots are adapted to receive dovetailed tongues 33 projecting from the under surfaces of wear members 34 which are thus securely held in place upon the upper surface of the corresponding base member. Obviously the wear members can be detachably secured to the bars by other means than the tongue and slot connection herein illustrated.

The wear members 34 are preferably of some non-metallic material. If of wood, it is preferred, though not essential, to arrange the grain of the wood substantially perpendicular to the plane of the cover.

If as here shown the wear members are in the form of short blocks 34, they are disposed in contact with one another and the meeting surfaces of adjoining blocks are tongued and grooved as indicated at 35 to provide a tight joint.

In order that the entire area of the top of the box may be of uniform width and available as a support for the moving wire I prefer to provide the removable end sections 6^a and 7^a of the box with wear members of a character similar to that of the blocks 34 as here shown. These wear members may consist of wooden strips 36 attached to the upper edges of the members 6^a and 7^a by means of countersunk screws 37.

In order to prevent leakage of air endwise through the slots in the cover into the space 9, I provide the sliding partitions 12 and 13 with extensions 38 which project up through the slots and terminate flush with the upper surfaces of the bars forming the cover. These extensions 38 preferably consist of blocks of wood or other suitable material fitting snugly within the slots in the cover and attached to the partitions 12 and 13 by means of screws 39.

When the box is in use the bars occupy the

positions indicated in Figs. 5 and 6. The several bars, which are of substantially uniform width from end to end, are spaced to provide slots 40 leading to chamber 9 in which the suction is maintained, and as the wire travels across these slots 40, the water is drawn down through the slots and is drained away through the passage 10. By adjusting the partitions 12 and 13 toward and from each other the chamber 9 may be made to cooperate with paper webs of different widths.

When the wear surface of the cover has become grooved or worn through long continued use, one or both of the end members 6^a or 7^a may be removed by first removing the corresponding collar 22 and the composite bars forming the cover may then be withdrawn endwise from the box without removing the box and without shutting down the machine. The bars may be removed very quickly and it is contemplated that a reserve supply of bars will be kept on hand so that on removal of the worn bars a new set may immediately be slipped into place and locked in position by the end members 6^a and 7^a so that the operation of the box need be suspended for but a few minutes. The worn bars may now be planed off to provide smooth wear surfaces and these bars will now be held in reserve until it is again necessary to replace the bars. When the material forming the wear surface of the bar has thus been resurfaced several times it may be replaced by fresh material. Since the base members are of metal they do not warp or become deformed through the action of the moisture so that the bars remain true and parallel. Furthermore as the bars have a metal to metal contact with the walls of the box with which they engage, there is no danger that swelling under the action of moisture will cause them to stick and thus to make removal difficult.

While I have here shown the cover as consisting of four bars it is to be understood that the number of bars is not of the essence of the invention but that any suitable number may be employed and I contemplate that certain of the advantages of the present invention may be found to reside in a cover having a single integral base member reaching from side to side of the box and provided with suitable slots, perforations or other means giving access to the interior of the box.

I claim:

1. A suction box for use with Fourdrinier machines, said box having a cover comprising a plurality of parallel spaced bars extending longitudinally of the box, and means at each end of the box engaging the ends only of the bars for retaining them in position, the bars being slidable endwise from off of the box when released from the retaining means at either end of the box.

2. A suction box for use in Fourdrinier machines, the upper portion of at least one end wall of the box being removable, and a plurality of spaced parallel bars extending longitudinally of the box and normally retained in position by the removable portion of the end wall of the box.

3. A suction box for use with Fourdrinier machines, said box having a cover comprising a plurality of spaced bars extending longitudinally of the box, the outermost bars fitting snugly against the side walls of the box, the end walls of the box comprising removable clamping elements engaging the ends of the several bars and closing the spaces between them.

4. A suction box for use with Fourdrinier machines, said box having a cover comprising a metal base member extending from one end of the box to the other, the base member having projecting flanges at its opposite ends, a removable clamping device engaging each of said flanges thereby normally to retain the base member in operative position, and a wear member secured to the base member.

5. In combination with the suction box of a Fourdrinier machine, a cover member slidable endwise of the box, a removable clamp at one end of the box at least for holding the cover member in operative position, said cover comprising a base and a series of blocks collectively constituting a wear member attached to the base.

6. A suction box for use with Fourdrinier machines, said box having cover guiding elements, and a cover member slidable longitudinally of the box, said cover comprising a metallic base adapted to engage the cover guiding elements of the box and a non-metallic wear element carried by the base.

7. In combination with the suction box of a Fourdrinier machine, a cover member adapted to slide endwise of the box, and a removable stop at one end of the box normally preventing removal of the cover, the cover comprising a base and a wooden top attached to the base.

8. A suction box for use with Fourdrinier machines, said box having cover guiding elements and a cover member comprising a sliding metallic base engaging said guiding elements of the box, said base having retaining means for positioning a removable wear element.

9. A suction box for use with Fourdrinier machines, said box having cover guiding surfaces, and a cover member comprising a base member sliding longitudinally of the box in contact with said guiding surfaces, the base member being provided with a groove for positioning a replaceable wear element.

10. A suction box for use with Fourdrinier machines, said box having means for supporting a removable cover member, and a cover comprising a plurality of spaced parallel elongate members of substantially uniform width from end to end and individually

removable from the box by movement endwise of the latter, each of said cover members having a non-metallic wear surface, and releasable clamping means at one end at least of the box engaging the ends only of said elongate cover members and normally holding said members in fixed operative relation to the box.

11. A suction box for use with Fourdrinier machines, said box having a cover comprising a plurality of spaced metallic bars extending longitudinally of the box, each bar carrying a series of blocks collectively constituting the wear surface of the bar, and a removable clamping member at the end of the box cooperable with the several bars for holding them in operative position.

12. A suction box for use with Fourdrinier machines, said box having a slidable cover comprising a base member having a recess in its upper surface and a wooden wear member seated in said recess with its grain running substantially perpendicular to the plane of the top of the box, and means normally engaging the end of the cover member to hold it in operative position.

13. A suction box for use with Fourdrinier machines, said box having a cover, removable means engaging the ends of the cover to retain it in normal position, the cover being slidable endwise of the box when freed from the retaining means, the cover comprising a base member having a dovetail slot in its upper surface, and a series of wooden blocks seated in said dovetail slot, said blocks being arranged with their grain substantially vertical and collectively constituting the wear surface of the cover member.

14. A suction box for use with Fourdrinier machines, said box having a cover comprising a plurality of spaced bars extending longitudinally of the box, said bars being of substantially uniform width from end to end, each bar comprising a metal base member having a dovetail slot in its upper surface and a series of wear blocks mounted upon each bar, each block having a tenon engaging the dovetail slot in its bar, and removable means engaging the ends of the several bars to retain them in operative position.

15. A suction box for use with Fourdrinier machines, said box having a cover comprising a metal base member extending from one end of the box to the other, the base member having projecting flanges at its opposite ends, a removable clamping device engaging each of said flanges thereby normally to retain the base member in operative position, a wooden wear member secured to the base member, and a wooden wear member attached to each clamping device and having its upper surface flush with that of the wear member carried by said metal base member.

Signed by me at Cumberland Mills, Maine, this seventeenth day of May, 1926.

ARCHELAUS LEWIS.