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SUCTION BOX CONDITIONER

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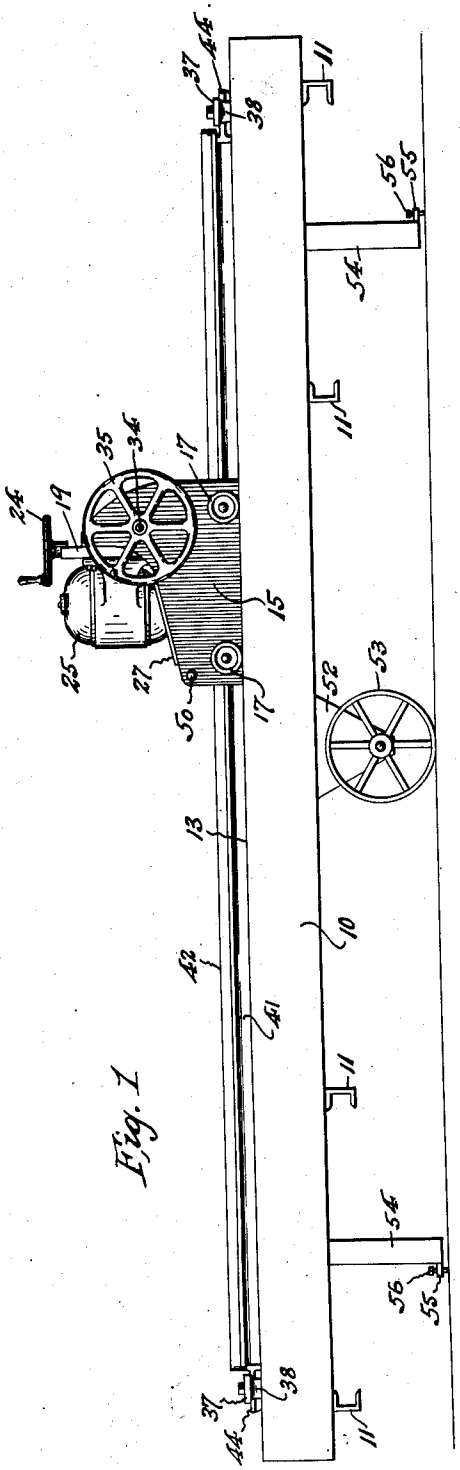


Fig. 1

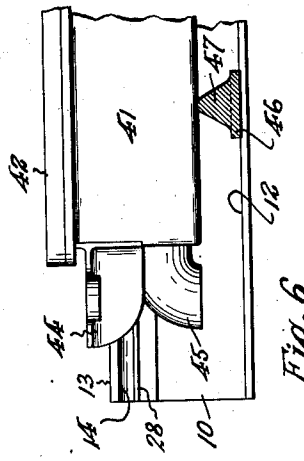


Fig. 6

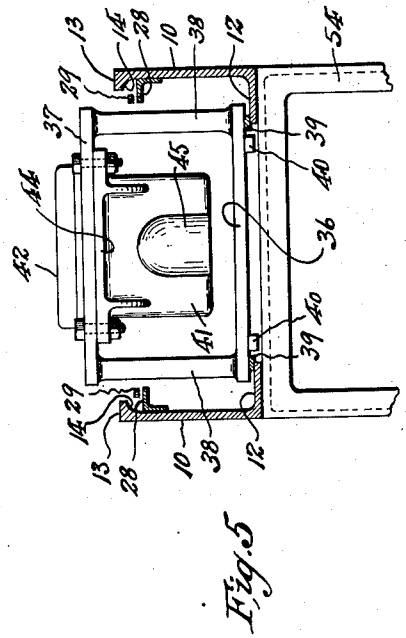


Fig. 5

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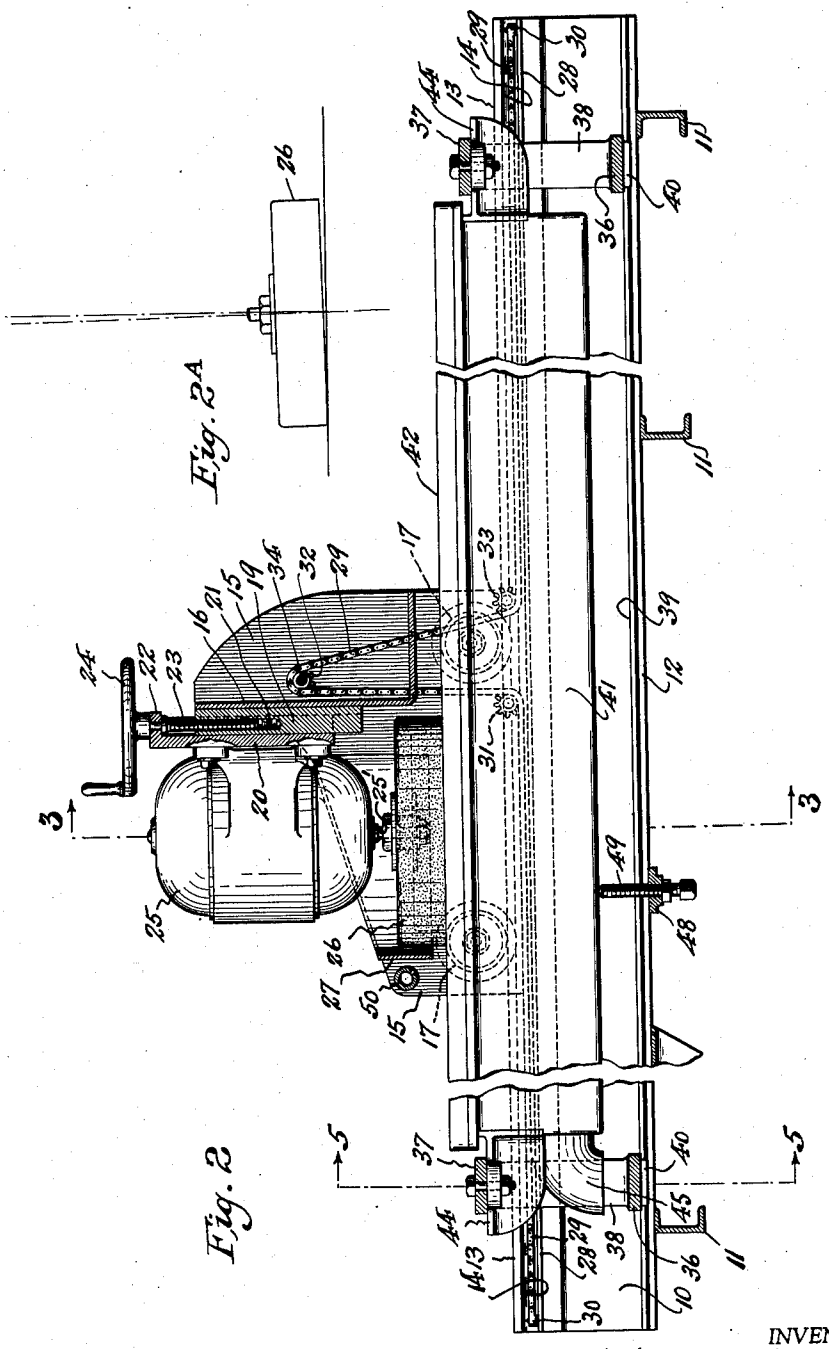


Fig. 2A

Fig. 2

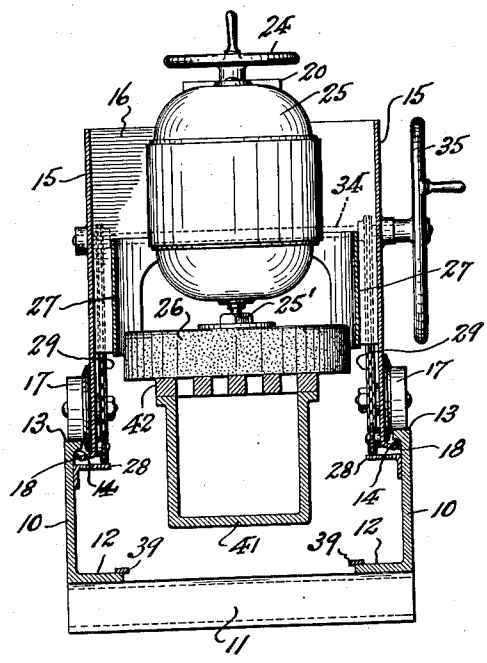
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SUCTION BOX CONDITIONER

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Fig. 3



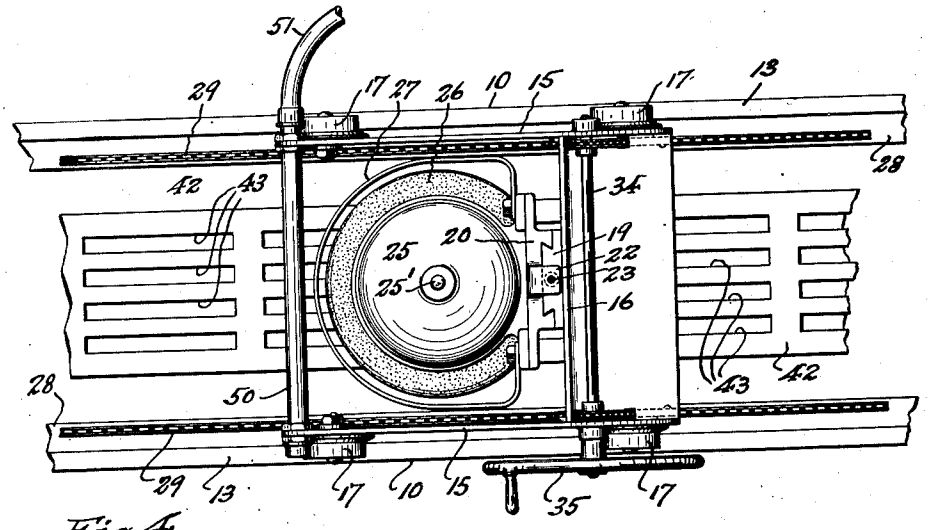


Fig. 4

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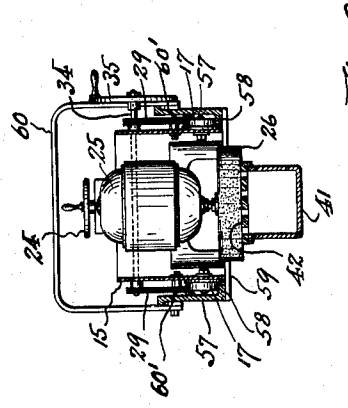


Fig. 8

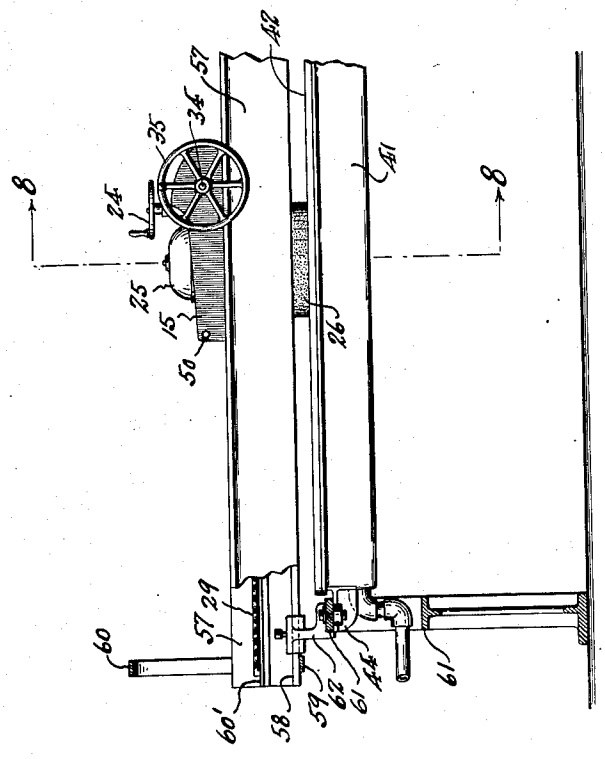


Fig. 7

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2,128,023

SUCTION BOX CONDITIONER

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Application March 8, 1937, Serial No. 129,654

5 Claims. (Cl. 51—56)

This invention relates to apparatus for resurfacing the covers of suction boxes used on paper making machines. In the operation of paper making machines, the movement of the Fourdrinier wire over the perforate top or cover of a suction box tends to unevenly wear the surface of the top or cover. Such wear soon grooves and roughens the cover surface, thus producing an uneven surface which not only impedes the proper movement of the Fourdrinier wire thereover, with resultant undue strain and wearing stress upon the wire, but also prevents the formation of a paper sheet which possesses the desired quality of uniform thickness. In order to eliminate such objectionable results, it is necessary to periodically recondition the worn surfaces of suction box covers, to again provide the same with requisite smooth, flat and uniformly even top surface.

It is the principal object of this invention to provide a simple and yet highly efficient mechanism by means of which the covers of suction boxes may be reconditioned; to this end the mechanism is of such novel construction and mode of operation that a suction box may be either operated upon thereby without necessity for removal of the box from its operative assembled relation to the paper making machine, or the suction box may be removed from the paper making machine and suitably mounted subject to the operation of the reconditioning mechanism.

Suction box covers are made of various materials, such e. g. as wood, metal or synthetic materials. In many instances the cover is made of hard wood so disposed that the end grain thereof lies in the plane of the cover surface. It is, therefore, a further object of this invention to provide a reconditioning apparatus wherein the resurfacing means comprises a power driven grinding element capable of quickly and smoothly dressing all types of cover material, and especially wooden covers having end grain surfaces.

Further objects of this invention are to provide, in a reconditioning apparatus of the kind mentioned, means to easily produce and control the travel of the grinding element relative to the surface of the suction box under treatment; to provide a novel angular mounting of the grinding element, so that grinding effect is attained without excess friction, and without applying undue strain or stress upon the suction box structure; to provide means to prevent chatter or vertical displacement of the grinding element relative to the suction box surface over which it is operatively moved; to provide means for easily and quickly adjusting the grinding element relative to the suction box surface so as to control and predetermine the degree or depth of grinding effect or cut; to provide means whereby the grinding effect may be carried on under water, thereby to eliminate risk of burning or like injury to the cover material; and to provide means for supporting a suction box against sagging or yielding to the pressure of the operating grinding element.

Other objects of the invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

Illustrative embodiments of the invention are shown in the accompanying drawings, in which:

Fig. 1 is a side elevation of one form of the novel suction box reconditioning apparatus according to this invention; Fig. 2 is an enlarged longitudinal sectional view of the same; Fig. 2A is a diagrammatic view to illustrate the operative set or angular disposition of the grinding element of the apparatus; Fig. 3 is a transverse sectional view of the apparatus, taken on line 3—3 in Fig. 2; Fig. 4 is a fragmentary plan view of the same; and Fig. 5 is a fragmentary transverse section, taken on line 5—5 in Fig. 2.

Fig. 6 is a fragmentary longitudinal section, showing a modified means for mounting and supporting a suction box in operative relation to the apparatus.

Fig. 7 is in part a side elevation and in part a sectional view, showing a modified form of the apparatus adapted to be arranged to recondition the cover of a suction box while the latter remains in operative assembled relation to a paper making machine of which it forms a part; and Fig. 8 is a transverse sectional view, taken on line 8—8 in said Fig. 7.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

In the form of the apparatus shown in Figs. 1 to 5 inclusive, which is adapted to receive and operate upon suction boxes which have been removed from paper making machines, the reference character 10 indicates the side plates of a track frame. These side plates are laterally spaced apart and are longitudinally parallel, the same being of a length calculated to somewhat exceed that of a standard suction box of maximum length. Said side plates 10 are secured together in the described relation by transverse tie-bars 11, which are suitably affixed to the under sides of the inwardly projecting bottom flanges 12 which bound the lower margins of said side

plates. The upper margins of the side plates 10 are formed to provide trackway rails 13, the inner portions of which provide shoulders 14 which overhang the inside faces of said side plates.

Movable longitudinally back and forth over the track frame is a carriage of any suitable construction. In one illustrative form thereof, this carriage includes side members 15, and secured to and extending between said side members is an upright carrier plate 16. Mounted on the exterior faces of said side members 15 are flanged traction wheels 17 which ride upon the trackway rails 13. Provided in connection with the lower marginal portions of said side members 15 are out-turned keeper flanges 18 which underlie the inwardly projecting shoulders 14 provided by the trackway rails 13. Said keeper flanges 18 hold the carriage to the trackway against undue vertical displacement, and thus prevent chatter of the grinding element, with which the carriage is equipped, when said grinding element is operating. Fixed upon the carrier plate 16 is a vertically disposed guide-block 19. Slidably mounted on said guide-block 19, subject to vertical adjusting movement thereon, is a carrier plate 20. The guide-block 19 is provided with an internally screw-threaded bore 21. Rotatably mounted in a bearing lug 22, with which the upper end of said carrier plate 20 is provided, is an adjusting screw 23, upon the upper end portion of which is affixed a hand-wheel 24 for manipulating the same. Suitably secured to the face of said carrier plate 20 is a power unit preferably in the form of an electric motor 25. Affixed to the lower end of the armature shaft 25' of said motor 25 is a grinding element 26. Preferably this grinding element 26 comprises a circular downwardly open cup-shaped body of suitable abrasive material. If desired, the grinding element 26 may be surrounded by a suitable guard member 27 which is anchored to the motor frame.

Means are provided for transmitting traveling movement to the carriage, whereby the same may be caused to move in either direction upon and along the trackway rails 13, thereby to move the grinding element 26 over the surface desired to be dressed thereby. To this end each side plate 10 is provided at its inner side, below and parallel to its trackway rail 13, with a longitudinally extending laterally projecting supporting flange 28. Supported by the flanges 28 to extend from one end to the other of each side plate 10 are drive chains 29; the ends of said chains being secured to the flanges 28 by anchor pieces 30. Affixed to the carriage side members 15 are forward idler sprockets 31, from which the chains extend upwardly and over drive sprockets 32, and thence downwardly to rearward idler sprockets 33 which are also affixed to said carriage side members 15. Said drive sprockets 32 are affixed upon a transverse drive shaft 34 which is journaled in and between said carriage side members 15. Affixed on an outer end of said drive shaft 34 is a crank wheel 35 by which said shaft and its drive sprockets 32 may be manually rotated in either direction. By rotating the shaft 34 and drive sprockets 32 in clockwise direction, the latter are caused to move relative to the fixed chains 29 from right to left, thereby causing the carriage and grinding element to advance along the trackway rails in like direction; and by rotating the shaft 34 and drive sprockets 32 in anticlockwise direction, the movement is reversed, and the carriage and grinding element is caused to advance along the trackway rails in the opposite direction, i. e. from left to right. By this means, a positive and easy control of the carriage and grinding element travel is attained by the operator, so that the grinding element may be advanced back and forth along the surface desired to be treated in such manner as to assure an even progressive grinding effect thereof.

Means are provided to support a suction-box, which has been removed from a paper making machine, between the side plates 10 and beneath the carriage and grinding element carried thereby. One form of such means comprises transverse yoke members, the same each comprising a base bar 36 and a bridge bar 37 supported from said base-bar by uprights or standards 38. Suitably affixed to the upper sides of the bottom flanges 12 of the side plates 10 of the track frame, are track bars 39 which extend longitudinally therealong. The ends of the base bars 36 are engaged on and supported by said track bars 39 so as to dispose the yoke members transversely between and in supported relation to the track frame, and so as to be movable to desired longitudinally spaced relation between the ends of said track-frame. Secured to the underside of said base bars 36 are cleats 40 which serve to prevent lateral displacement of said yoke members with respect to their desired transverse disposition between the side plates 10 of said track frame.

The reference character 41 indicates a suction box, which has been removed from the paper-making machine which it serves, and which it is desired to mount in operative relation to the reconditioning apparatus, subject to the operation of its grinding element. The top of the suction box 41 is closed by a cover 42 having suitably formed and disposed openings 43 extending therethrough to communicate with the box interior. The suction box is usually provided at its respective ends with suspension brackets 44, whereby it is secured to and between the side frames of a paper-making machine, when operatively assembled with the latter. The suction box is also provided with a drain outlet 45 which, in use of the box on a paper-making machine, is connected with a suitable exhaust or suction pump means.

To mount the suction box in operative relation to the reconditioning apparatus, the same is inserted between the side plates 10 of the track frame, whereupon the yoke members are moved along the track bars 39 to positions adjacent to the respective ends of the suction box, and so that the suspension brackets 44 of the latter extend beneath the bridge bars 37 of said yoke members, thereby permitting the former to be bolted to the latter, and thus suspending the suction box by its ends so that the same will assume the same deflection incident to such suspension that it would assume when similarly mounted in operative assembled relation to a paper-making machine.

While the above described method and means for mounting the suction box relative to the reconditioning apparatus is satisfactory, other mounting arrangements may be employed, such, for example, as shown in Fig. 6, wherein, in place of the above-described yoke members, simple pedestal type supports may be arranged beneath the suction box bottom adjacent to the ends thereof. In the form, as above in Fig. 6, these pedestal type supports comprise a base bar 46 to rest upon and bridge over between the bottom flanges 12 of the track frame side plates 10,

the base bar 46 having an upstanding pedestal portion 47 to engage the suction box bottom.

With either of the above-described arrangements for supporting the suction box, additional adjustable means is provided to engage the suction box bottom intermediate the box ends so as to brace the same against undue sagging or yielding under the pressure of the operating grinding element when the latter is applied to the suction box cover. This anti-sag support comprises a cross-bar 48 affixed to and extending between the bottom flanges 12 of the track frame side plates 10, and threaded through said cross-bar 48 is an adjustable jack-screw 49 which, when the suction box is in place, may be adjusted to abut and thereby brace the bottom of the suction box at a point intermediate its ends.

When the suction box is mounted in place, operating current is supplied to the motor 25 so that the power of the latter will rotate the grinding element 26. By manipulating the adjusting screw 23, the motor and grinding element may be raised or lowered as required, and when the suction box is in position to be engaged, the grinding element is lowered into contact therewith and its position regulated or set in accordance with the depth of grinding effect desired to be produced upon the surface of the suction box cover 42. It is preferable that the axis of rotation of the grinding element and its driving motor be inclined somewhat from a strict perpendicular, say approximately two degrees, so that the effective grinding point of the element will be confined to but a portion of its bottom marginal surface, while the remaining area of its bottom surface clears the suction box cover surface. This is indicated diagrammatically in Fig. 2A. By such mounting, the grinding effect is more efficiently attained without excess friction or the application of undue stress or strain upon the suction box structure or the apparatus itself, and also clearance is provided for the better discharge of material that is ground away from the suction box cover surface.

The operating grinding element is caused to advance progressively from one end of the suction box cover to the other by manipulating the crank wheel 35, and as already indicated the travel may be in either direction. Successive cuts may be made by adjustably lowering the grinding element as required.

Suitably arranged on the carriage to extend transversely across the same between its side members 15 and adjacent to the grinding element 26 is a sprinkler head 50 to which water is supplied from a source thereof by a flexible conduit or hose 51 suitably coupled to one end of said sprinkler head. The water is discharged from the sprinkler head upon the suction box cover surface, so that the grinding effect produced by the grinding element may be carried on under water, thereby eliminating risk of burning or like injury to the cover material.

It is desirable that the reconditioning apparatus be easily movable from place to place so that it may be brought to the vicinity of paper-making machines the suction boxes of which are desired to be reconditioned, or moved to a place of storage when not in use. To this end the track frame, comprised by the side plates 10 and tie-bars 11, is provided intermediate the ends thereof, with an axle or bolster frame 52 upon which are mounted a pair of traction wheels 53. Adjacent to each end of the track frame, and suitably secured thereto, are leg frames 54, in connection with the foot-pieces 55 of which are provided adjustable foot screws 56. When the track frame is wheeled to a desired location of use, the foot-screws 56 are manipulated to project the same downwardly into abutment with the floor upon which the track frame stands, thereby stabilizing the same, and, if desired, raising the same sufficiently to cause the traction wheels 53 to clear the floor surface, so that the track frame is supported immovably by the leg frames 54, and thus made stationary subject to the mounting of a suction box therein ready to be operated upon by the grinding element.

It is, in some cases, desired to resurface suction box covers without removing the suction box from its normal assembled relation to the paper-making machine which it serves. In a somewhat modified form, the apparatus made according to and embodying the principles of the instant invention is admirably adapted for accomplishing this end. A form of construction of the apparatus suitable for use in such manner is shown in Figs. 7 and 8 of the accompanying drawings. In such form, the apparatus comprises a track frame formed by laterally spaced longitudinally extending side plates 57 having inwardly projecting track flanges 58 extending along their lower margins. The side plates 57 may be secured in assembled relation by cross-pieces 59 extending therebetween adjacent to their ends, and also, if desired by upwardly bowed transverse yoke-frames 60. A carriage of the same general construction and arrangement as that above described (the parts of which are indicated by corresponding reference numerals) is mounted to travel on the track frame in such manner that its traction wheels ride on the track flanges 58 (see Fig. 8). The carriage is equipped with a motor driven grinding element 26 which can be projected below the underside of the track frame. The side plates 57 are provided with internal supporting flanges 60' which serve both to support the carriage drive chains, as well as to overhang the carriage traction wheels so as to prevent vertical displacement of the carriage when the grinding element is pressed to its work.

In the use of the use of the modified form of the apparatus, the same is disposed above and longitudinally aligned with the top of a suction box 41 and its cover 42 as normally mounted in assembled relation to a paper making machine in transverse extension between the machine side frames 61 to which the end brackets 44 of the box are affixed. The track frame is supported at each end in any suitable manner. For example, adjustable footing members 62 may be provided to bridge between the side plates 57 adjacent to the ends thereof, these footing members being engageable with the side frames 61 of the paper-making machine, thus supporting the apparatus in operative relation to the underlying suction box. In operation of the described modified form of the apparatus, the grinding element is adjusted to produce desired grinding contact with the top surface of the underlying suction box, thereupon the carriage is caused to traverse the track frame and thereby advance the grinding element along the box cover surface with operative dressing or reconditioning effect thereon.

From the above description it will be obvious that the instant invention provides a very efficient, and easily adjusted and controlled mechanism for the intended purposes. We are aware that various changes may be made in the above

described constructions, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof as defined by the following claims. It is therefore intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:—

1. In a suction-box top surfacing machine, a track frame, the track rails of which are adapted to straddle a supported suction-box longitudinally aligned therewith, a wheeled carriage movable over said track rails intermediate the ends of said track frame and above said suction-box, a power rotated grinding means supported by said carriage for operative engagement with said suction-box top when moved by said carriage over the face thereof, means to adjust said grinding means relative to said suction-box top, a transverse shaft rotatably mounted on said carriage, means for manually rotating said shaft, drive sprocket means on said shaft, fore and aft idler sprocket means mounted on said carriage, chain means extending from end to end of said track frame, said chain means having respective ends thereof fixedly anchored to corresponding respective ends of said track frame, and said chain means extending over said drive sprocket means and beneath said fore and aft idler sprocket means.

2. In a suction-box top surfacing machine as defined in claim 1, suction-box end supporting means adjustably mounted upon and adjacent to the end portions of said track frame, whereby a suction-box is suspended solely from its ends so as to permit normal sagging deflection thereof corresponding to that occurring when the same is operatively mounted in a paper making machine, and vertically adjustable stop means carried by said track frame intermediate its ends and movable to abut the bottom of the normally deflected suction-box intermediate its supported ends so as to retain the same against sagging beyond the limits of its normal deflection under the pressure of the operated grinding element.

3. In a suction-box top surfacing machine having a track frame and a wheeled carriage bearing a power driven grinding apparatus, means to support a suction-box so as to present its top to the action of said grinding apparatus, said means comprising suction-box end supporting means adjustably mounted upon and adjacent to the end portions of said track frame, whereby a suction-box is suspended solely from its ends so as to permit normal sagging deflection thereof corresponding to that occurring when the same is operatively mounted in a paper making machine, and vertically adjustable stop means carried by said track frame intermediate its ends and movable to abut the bottom of the normally deflected suction-box intermediate its supported ends so as to retain the same against sagging beyond the limits of its normal deflection under the pressure of the operated grinding apparatus.

4. In a suction-box top surfacing machine, a pair of track frame plates in relatively fixed laterally spaced relation, said plates having rail portions along their margins disposed to provide underlying shoulders offset from the inner face planes of said plates, a carriage bearing a power driven grinding apparatus, means intermediate said plates for supporting a suction-box with its top presented to the action of said grinding apparatus, said carriage having side members provided with wheels to travel upon the top of said rail portions, said carriage side members having projecting keeper means below said wheels and disposed to extend beneath and slidingly engage said shoulders to hold said carriage against undue vertical vibration and consequent chattering of said grinding means, and means to move said carriage back and forth over said rail portions.

5. In a suction-box top surfacing machine as defined in claim 4, wherein the means to move said carriage back and forth over said rail portions comprises, a transverse shaft rotatably mounted on said carriage, means for manually rotating said shaft, drive sprockets on the respective end portions of said shaft adjacent to the carriage side members, fore and aft idler sprockets mounted on the carriage side members, chains extending from end to end of said track frame plates, said chains respectively having opposite ends thereof fixedly anchored to corresponding end portions of the respective track frame plates, and said chains respectively extending over a drive sprocket and fore and aft idler sprockets of opposite side members of said carriage.

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