Aug. 14, 1923. 1,464,513

D. M. SUTHERLAND, JR

SHEET HANDLING DEVICE

Filed Oct. 31, 1919 3 Sheets-Sheet 1

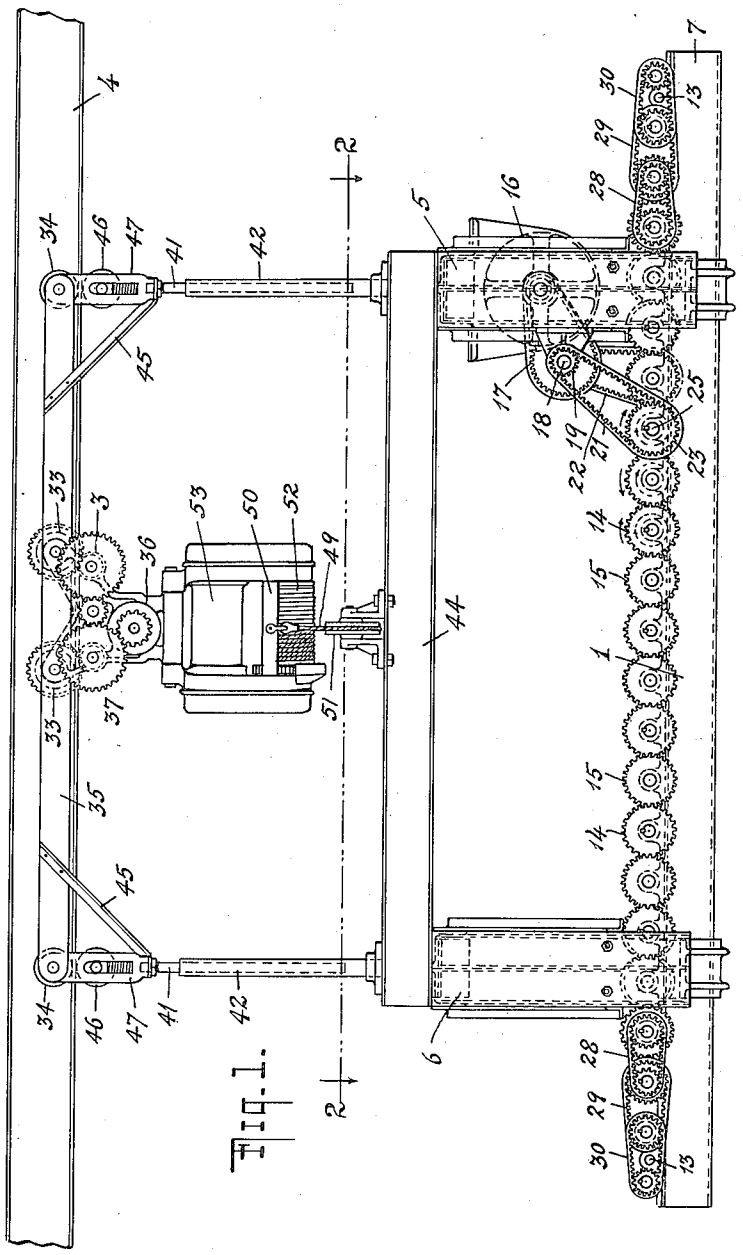

FIG. 1.

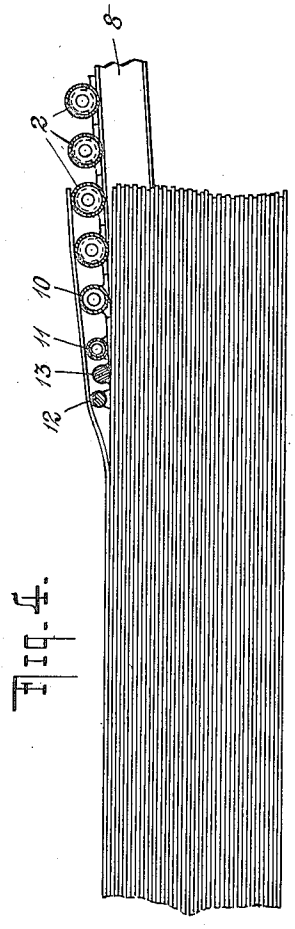

FIG. 4.

WITNESSES

G. V. Rasmussen

Henry Ruhl

INVENTOR

DANIEL M. SUTHERLAND JR.

BY

Brown Holcomb

ATTORNEYS

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D. M. SUTHERLAND, JR

SHEET HANDLING DEVICE

Filed Oct. 31, 1919 3 Sheets-Sheet 2

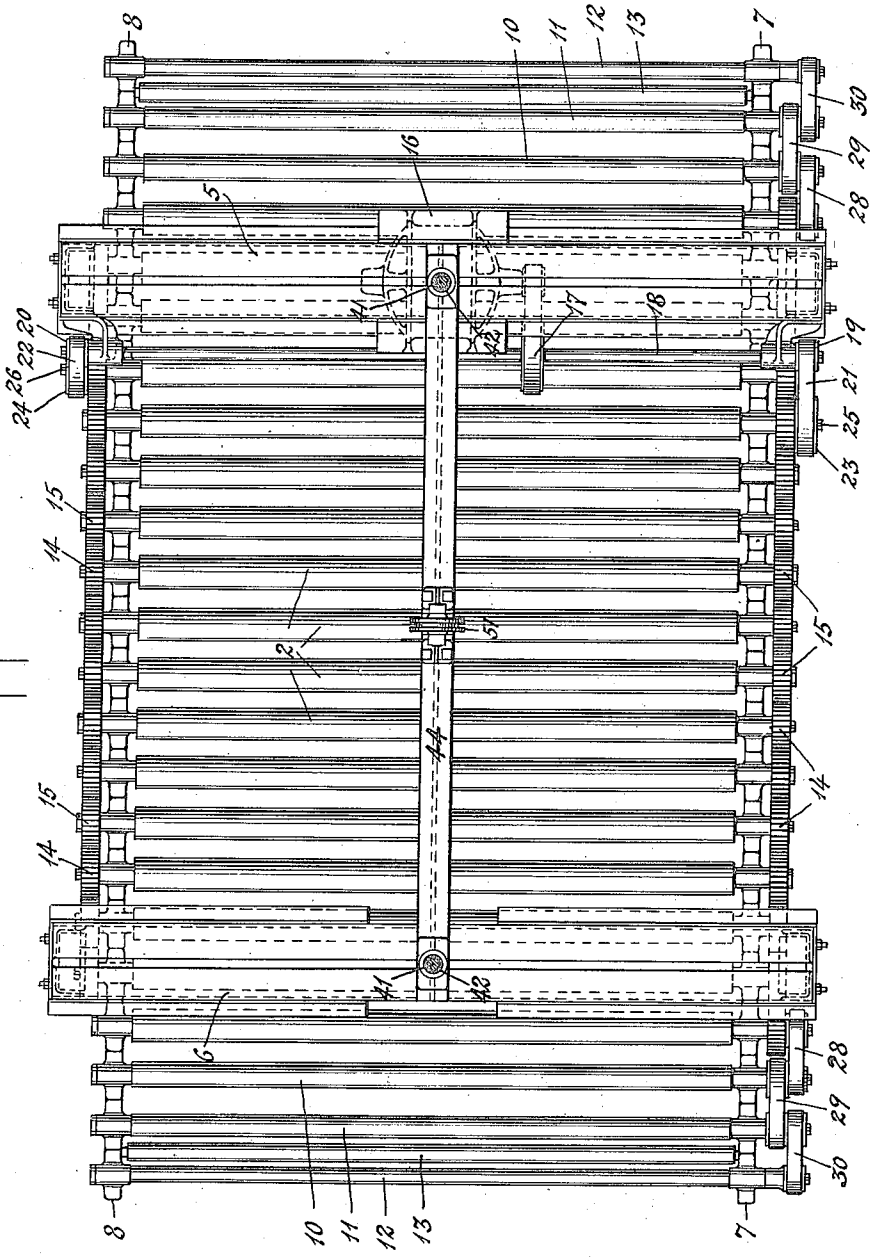

Fig. 2.

WITNESSES

G. V. Rasmussen

Henry Ruhl

INVENTOR

DANIEL M. SUTHERLAND JR.

BY Pomeroy & Schramek

ATTORNEYS

Aug. 14, 1923. 1,464,513

D. M. SUTHERLAND, JR

SHEET HANDLING DEVICE

Filed Oct. 31, 1919 3 Sheets-Sheet 3

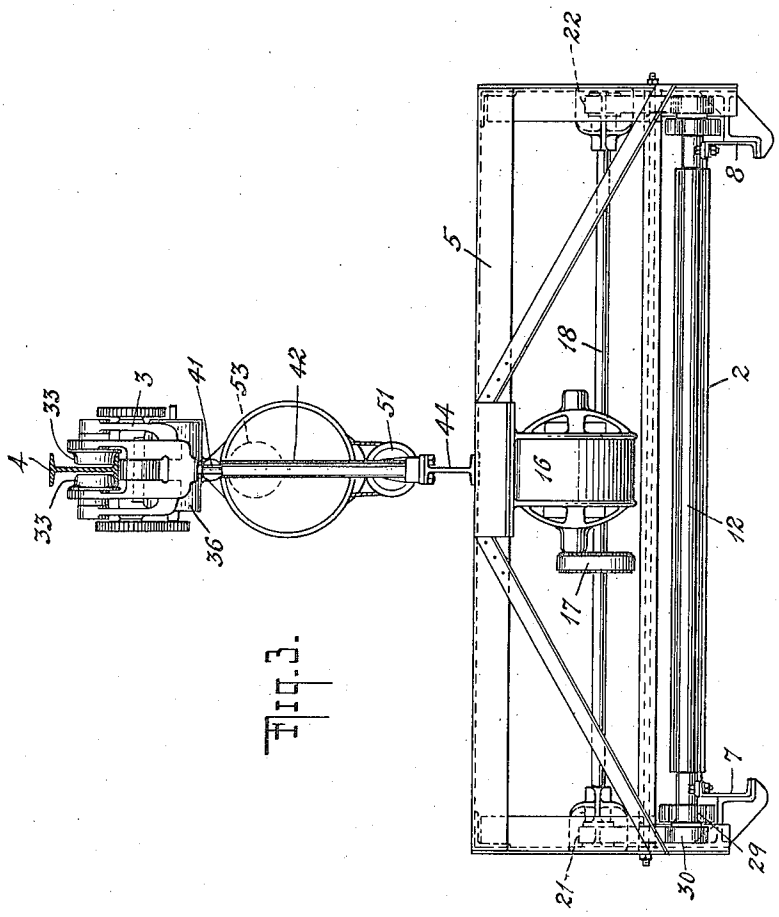

Fig. 3.

WITNESSES

G. V. Rasmussen

Henry Ruhl

INVENTOR

DANIEL M. SUTHERLAND JR.

BY Brisbane Hotchkiss

ATTORNEYS

Patented Aug. 14, 1923. 1,464,513

UNITED STATES PATENT OFFICE.

DANIEL M. SUTHERLAND, JR., OF TRENTON, NEW JERSEY, ASSIGNOR TO THE AGASOTE MILLBOARD CO., OF EWING TOWNSHIP, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SHEET-HANDLING DEVICE.

Application filed October 31, 1919. Serial No. 334,749.

To all whom it may concern:

Be it known that I, DANIEL M. SUTHERLAND, Jr., a subject of the King of Great Britain, and a resident of Trenton, county of Mercer, and State of New Jersey, have invented certain new and useful Improvements in a Sheet-Handling Device, of which the following is a specification.

The present invention relates to conveyor mechanism for handling sheets of paper pulp, wood pulp and the like, and particularly thick, large sheets of this material. The principal object of the invention is to provide an improved apparatus for transporting wet sheets of pulp from one apparatus to another and to or from a pile of such sheets.

Pulp board sheets are manufactured from pulp by processes which involve treatment of the sheets successively in different apparatus and the wet sheets must be conveyed from one apparatus to another and at times to and from a pile of wet sheets. The wet sheets are difficult to handle without damage because they are fragile and because the "skin" which forms the surface is soft and easily marked or broken. It is especially necessary to avoid any damage to the sheet or marring of the surface for board that is to have a high finish, inasmuch as any surface imperfections are very objectionable and difficult to remove.

The present invention provides a carrier device particularly designed to handle large sheets of wet pulp without marking the surface of the sheet and without other damage thereto. While the invention is particularly designed for the specific use of handling such wet sheets, it is to be understood that it may be advantageously applied for handling other articles and sheets or strips of other material and such use is contemplated as within the scope of the invention.

The principle of the invention may best be understood from the description of an apparatus embodying the same. Such an apparatus is shown in the accompanying drawings in which

Figure 1 is a side elevation of a sheet carrier constructed in accordance with the invention;

Fig. 2 is a plan view of the carrier table, the supports therefor being shown in section as indicated by the line 2—2 of Fig. 1;

Fig. 3 is a view in end elevation of the device as shown in Fig. 1;

Fig. 4 is a fragmentary view showing the position of the carrier table when picking up or depositing a sheet of wet pulp upon a pile of such sheets.

The sheet carrier in its preferred and illustrated form comprises a movable carrier table 1, having closely spaced parallel rolls, 2, 2, for supporting the wet sheets, together with an overhead carriage 3 movable upon a suitable track 4 from which carriage the carrier table is suspended. The table is adapted to be raised and lowered relative to the carriage and the carriage is arranged to be moved along the track under the control of the operator.

The carrier table comprises a suitable frame having for example supporting yokes, 5, 6, and side bars 7, 8, secured to the yokes. A series of parallel rolls 2, 2, are rotatably mounted in the side bars in closely spaced relation to provide a substantially continuous support for the sheet of wet pulp or other material to be carried. It is desirable to so shape the ends of the table that while a sheet is being picked up or deposited it will not be unduly bent at the edge of the table. This may advantageously be accomplished by making the ends tapered to a relatively thin edge and in the construction illustrated this is done by providing at each end additional rolls 10, 11, 12, which are of successively smaller diameters, as shown in Figs. 2 and 4. As a result of this expedient, when picking up or depositing a sheet, the smaller rolls act as a wedge between the sheet and the table or pile, (see Fig. 4).

In operation, the rolls engaging the under surface of a sheet being picked up or deposited, rotate at a peripheral speed such that there is no tearing or abrading stress upon the sheet, care being taken that the carrier is at a sufficient height to lift the rolls well above the surface of the next sheet below, so as to avoid abrading of such sheet. As, however, the carrier is, or may be, slightly tilted when the upper sheet first engages the rolls, and there is, or may be, some danger of having the surface of the next lower sheet abraded by contact with the first three or four rolls, I provide a freely rotatable roll 13, positioned to project slightly below a plane tangent to the lower

surfaces of the rolls. Such roll supports the rolls 10, 11 and 12, sufficiently to clear the lower sheet.

Suitable gearing is provided for driving the rolls 10, 11, 12, simultaneously in either direction and at the same peripheral speed. For the purpose of illustration, I have shown sets of intermeshing gears mounted upon the ends of the roll shafts upon opposite sides of the table. Alternate gears 14 on each side are secured to the respective shafts, while the other gears 15 are loosely rotatable upon the shafts and serve merely as idlers. These gears are so driven and so arranged that each roll shaft is driven by a gear 14 secured to one end thereof and all of the rolls are positively driven in the same direction. The power for driving these gears may be supplied as shown by a suitable reversible motor 16 carried in the yoke 5 and connected as by sprocket wheels and a chain 17 to drive a transverse shaft 18 from which in turn the gears 14, 15, are driven. As shown, sprocket wheels 19, 20, are secured upon opposite ends of the shaft 18 and are connected by chains 21, 22, to sprocket wheels, 23, 24, secured respectively to roll shafts 25, 26. The fast gears 14 are thus driven all in the same direction and effect the desired driving of the rolls.

Gearing of the same type may be arranged to drive the smaller rolls 10, 11 and 12, at each end of the carrier but certain complications are introduced by the faster speeds required and by the spacing of the rolls. For this reason I prefer to employ sprocket gearing. The arrangement shown is the same for both sets of smaller rolls. Sprocket wheels are secured to the shafts of the rolls 10, 11 and 12, and to the shaft of the next adjacent roll 2, the several wheels being of such relative sizes that the peripheral speed of all rolls will be the same. These sprocket wheels are connected by sprocket chains 28, 29 and 30.

The carriage 3 from which the table is suspended, is mounted to travel upon a suitable overhead track 4. This track is shown as consisting of an I-beam on the flanges of which run the rollers or wheels 33, 34, rotatably carried on the side bars 35 of the carriage. In order to control the position of the carriage, certain of the supporting wheels are driven by a suitable reversible motor. By way of illustration, the wheels 33, 33, are shown as driven from a motor conventionally indicated at 36, by means of a suitable train of gears 37, so arranged that a suitable speed may be obtained. The carrier table 1 may be suspended from the carriage 3, in any suitable or desirable manner. As shown, guides or guide rods 41, 41, depending from the carriage, are loosely received in tubular guides 42, 42, rigidly secured to the beam 44 of the carrier table frame. The guide rods are prevented from swinging by braces 45. I prefer also to provide spring-pressed rollers 46 mounted in the heads 47 of the guide rods and engaging the under side of the track to prevent lifting of one end of the carrier upon any swinging of the table which may occur in operation.

The weight of the carrier table is supported by a cable 49 secured to a cross-bar 50 from which it runs under a pulley 51 carried by the beam 44 and upwardly to the drum 52, around which it is wound. The drum 52 is suspended from the carriage 3 and is driven by a suitable reversible motor 53. The manner of supporting the carrier table permits it to tip downwardly at one end when picking up or depositing a sheet of material, as shown in Fig. 4. All the motors are preferably arranged for remote control from a suitable control operating station in a manner well known in the art.

In operation, when it is desired to pick up a sheet of pulp from a table or from a pile of such sheets, the end of the carrier is introduced under the edge of the sheet and the rolls are driven to draw the sheet onto the table. As the rolls are rotated to feed the pulp onto the carrier table, the table itself is moved bodily forward at a speed corresponding to the surface speed of the rolls so that no tension or compression is exerted upon the sheet of wet pulp but the carrier picks up the pulp with as little disturbance of the wet sheet as possible. The position of the parts during the picking up of the sheet is indicated in Fig. 4. When it is desired to deposit a sheet, the operation is reversed and the table is withdrawn at a speed corresponding to the surface speed of the rolls as driven to deposit the sheet.

I claim:

1. In an apparatus of the character described, the combination with a carrier table having a plurality of rolls closely spaced to support a sheet of material and means for driving said rolls, of means for moving said carrier in directions transverse to the axes of said rolls at a speed corresponding to the peripheral speed of the rolls while the rolls are rotatably driven.

2. In an apparatus of the character described, the combination with a carrier table having a plurality of rolls closely spaced to support a sheet of material, of a carrier from which said table is bodily suspended, said carrier being movable in directions transverse to the axes of said rolls.

3. In an apparatus of the character described, the combination with a carrier table having a plurality of rolls closely spaced to support a sheet of material, the rolls adjacent one edge being of progressively smaller diameter and means for driving said

rolls at the same peripheral speed, substantially as described.

4. In an apparatus of the character described, a carrier table having a plurality of rolls closely spaced and of equal size and a smaller roll at one edge to provide in effect a thin edge substantially as and for the purpose described.

5. In an apparatus of the character described, the combination with a carrier table having a plurality of rolls closely spaced to support a sheet of material, the rolls adjacent one edge being of progressively smaller diameter and means for driving said rolls at the same peripheral speed, and means for moving said table in directions at right angles to the axes of said rolls at a speed corresponding to the peripheral speed of said rolls.

6. In an apparatus of the kind described, the combination of an overhead track, a carriage, track engaging wheels on said carriage whereby it is movably mounted on said tracks, means for driving said wheels to actuate said carriage, a carrier-table suspended from said carriage in a manner to permit a rocking movement thereof, a plurality of parallel, closely spaced rolls mounted on said table to form a sheet support, the axes of said rolls extending at right angles to said track and means for driving said rolls.

7. In an apparatus of the kind described, the combination of a carrier-table, means movably mounted on said table for handling material and mechanism for shifting said carrier-table relatively to the material being handled and at a speed corresponding to the handling speed of said movable means.

In testimony whereof I have hereunto set my hand.

DANIEL M. SUTHERLAND, JR.