

Dec. 12, 1961

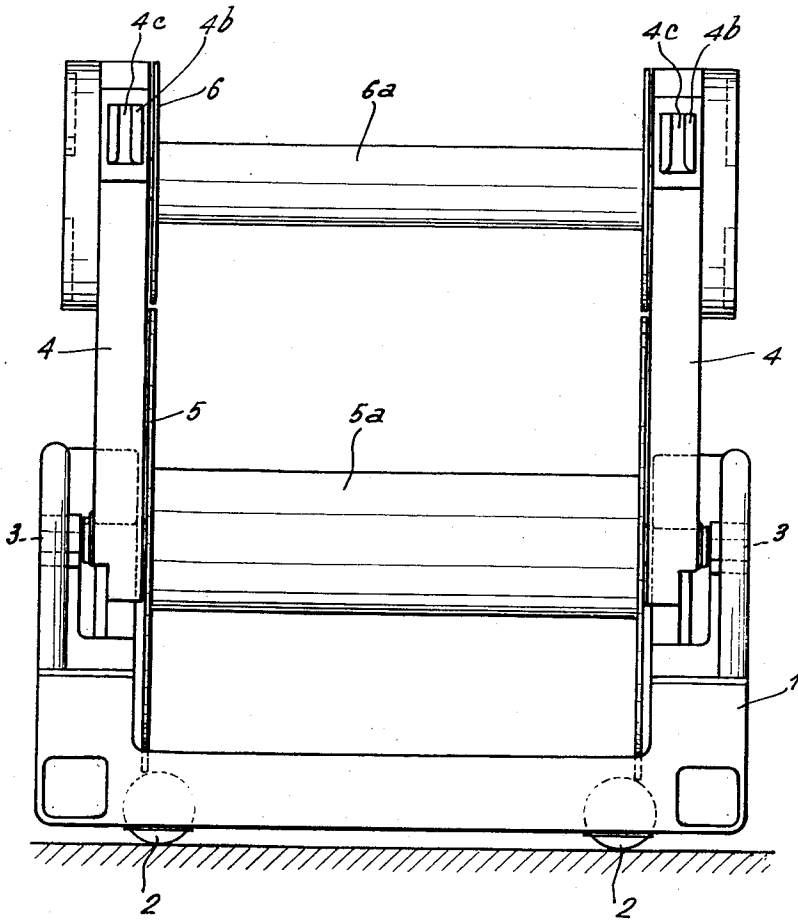
N. NEBOUT
APPARATUS FOR HANDLING PLIES OF
RUBBERIZED FABRIC AND THE LIKE

3,012,735

Filed March 3, 1958

10 Sheets-Sheet 2

Fig. 2



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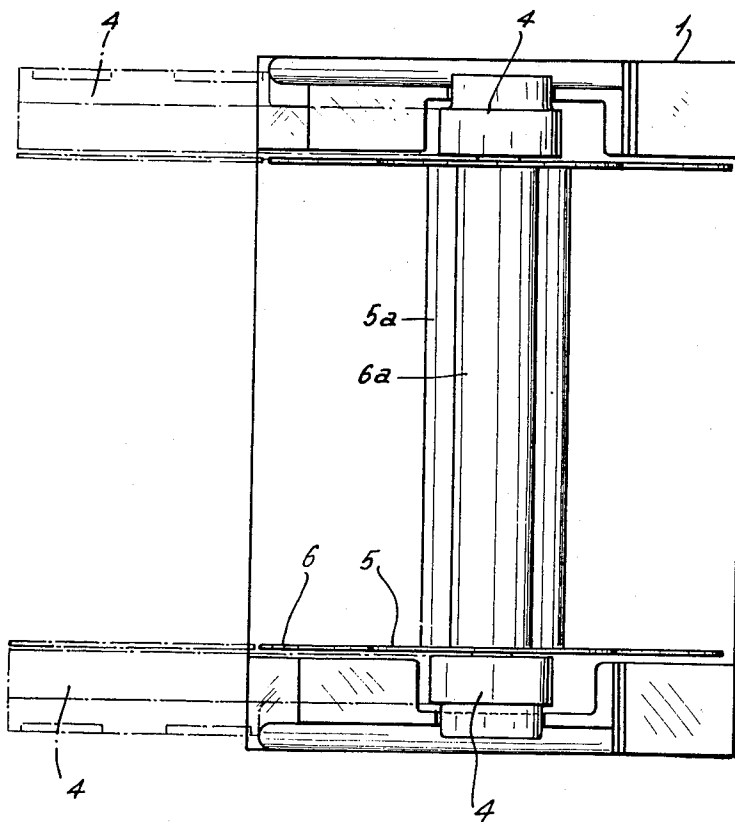
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Fig. 3



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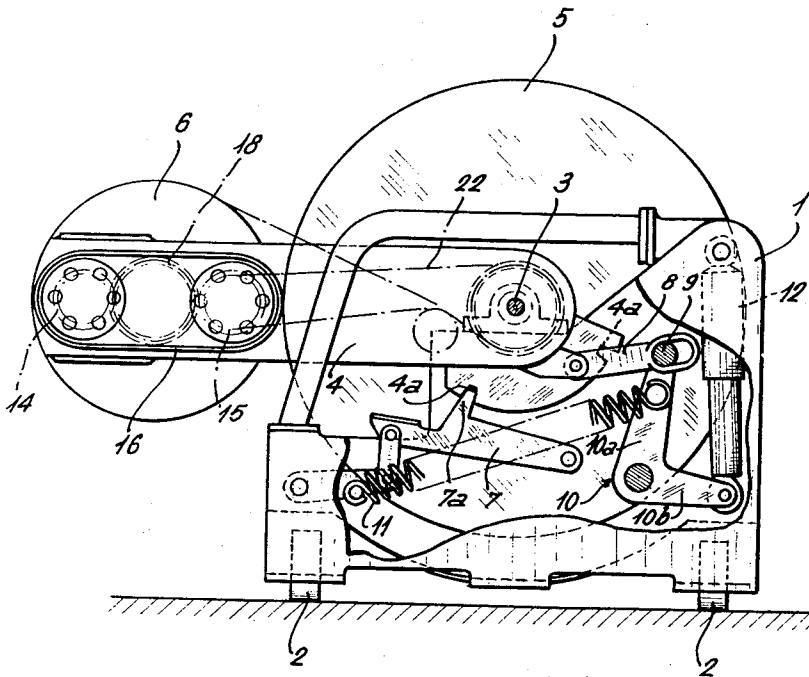
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Fig. 4



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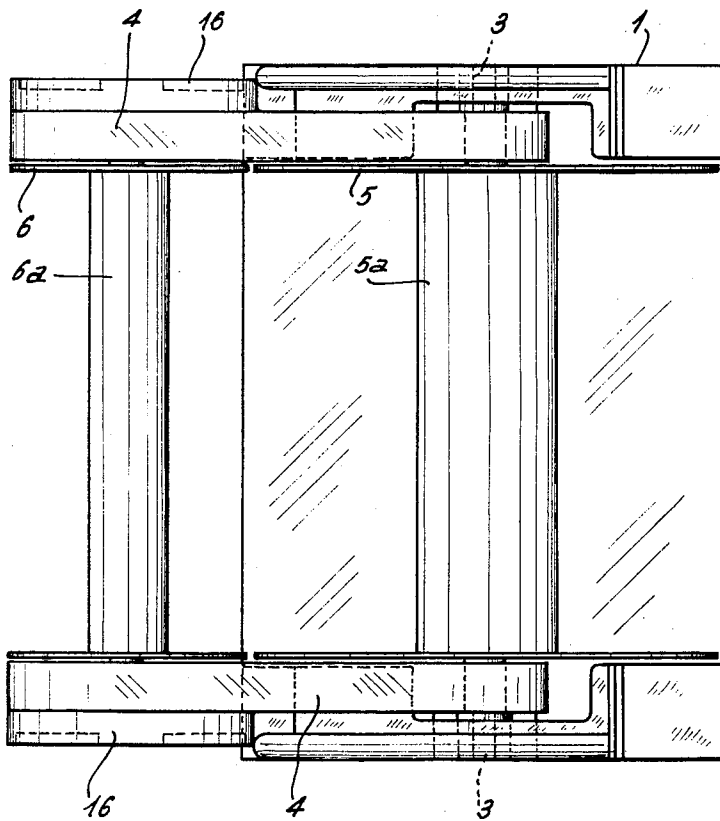
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Fig. 5



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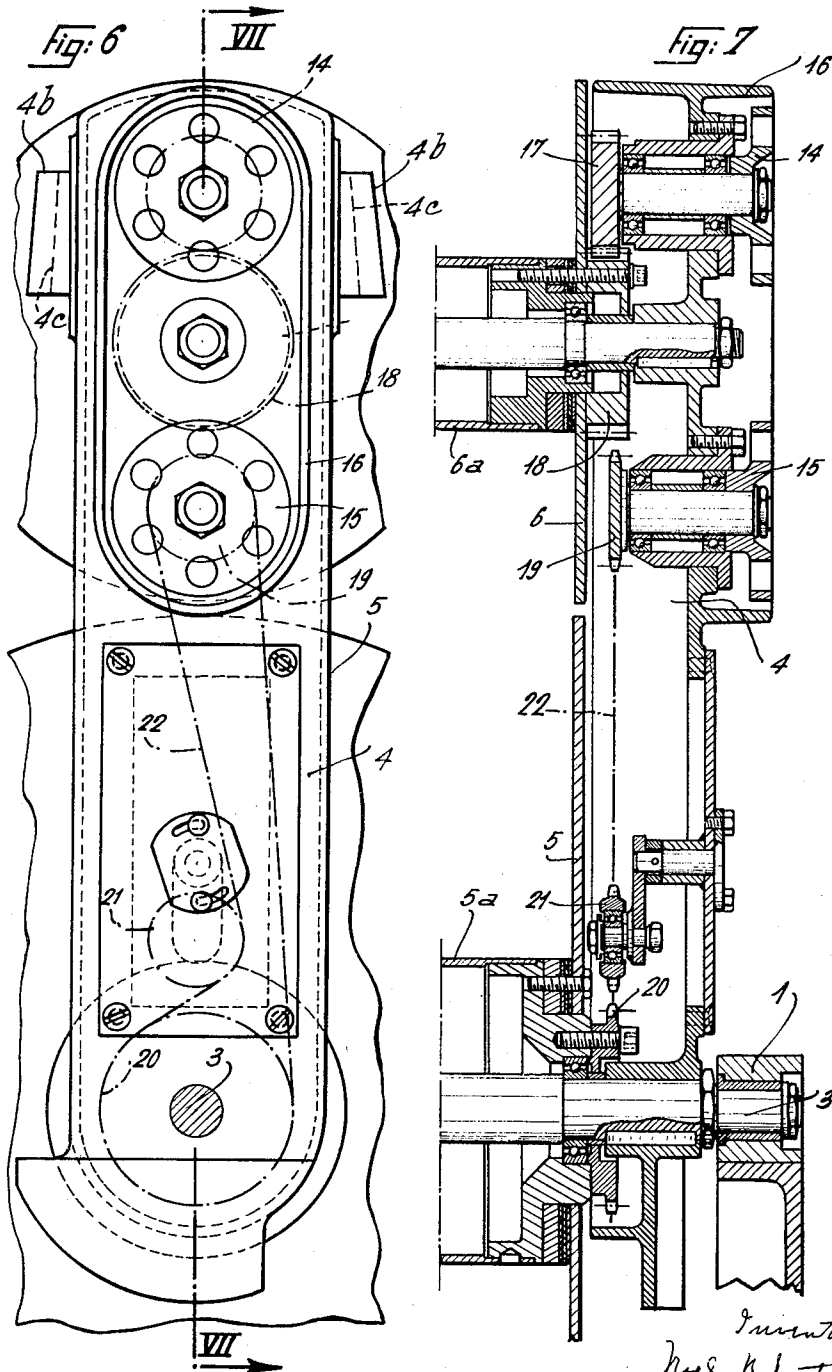
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10 Sheets-Sheet 6



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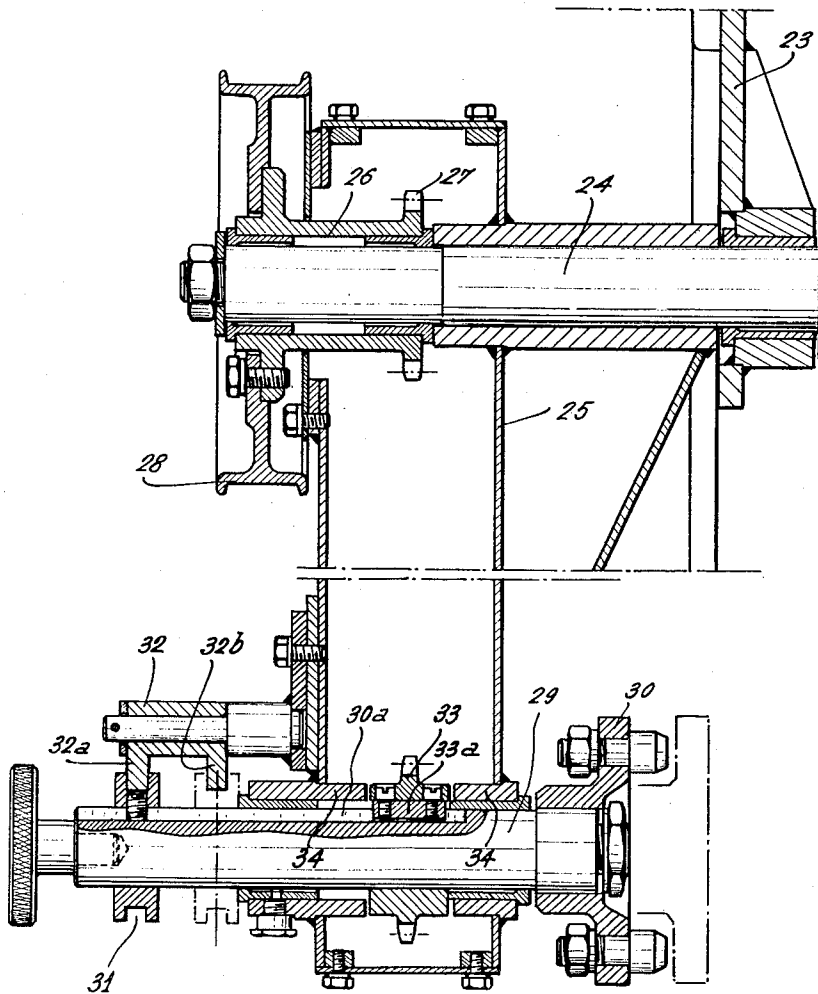
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Fig. 8



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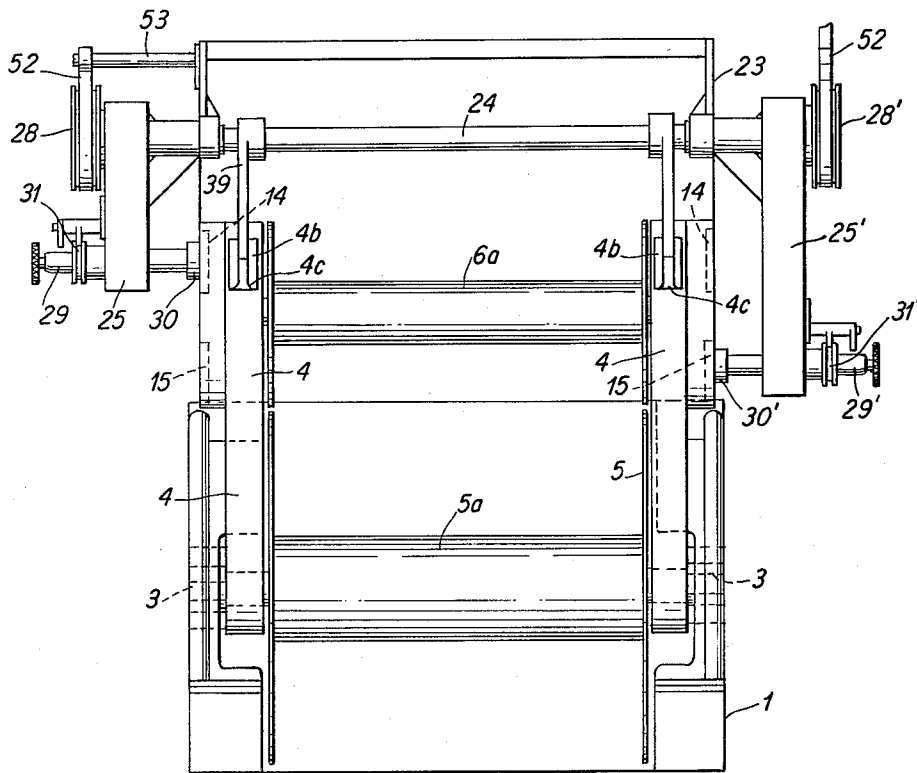
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Fig. 8a



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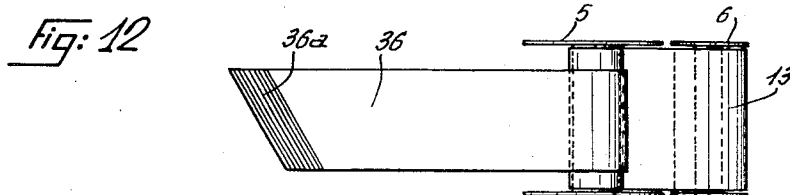
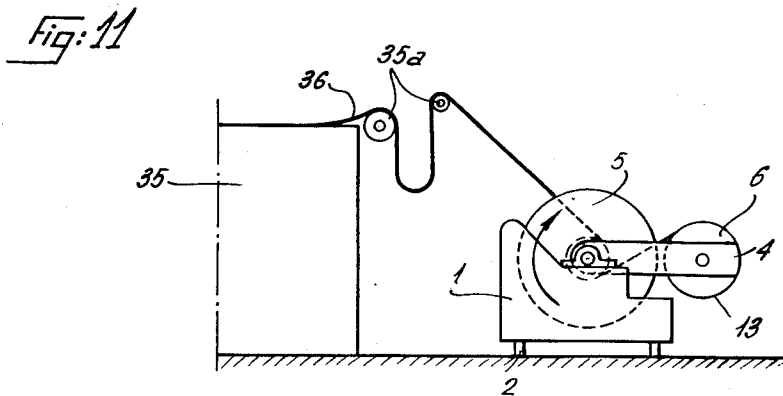
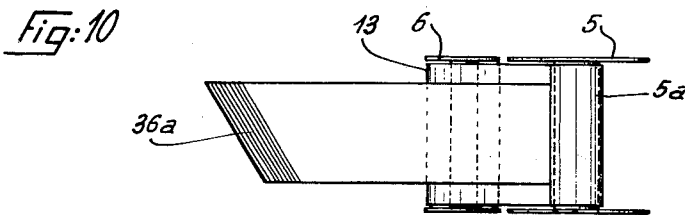
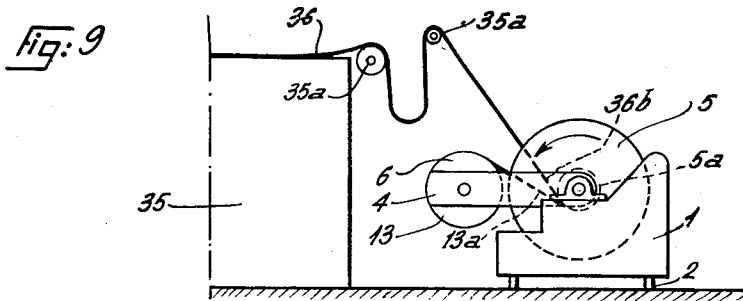
Dec. 12, 1961

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10 Sheets-Sheet 9



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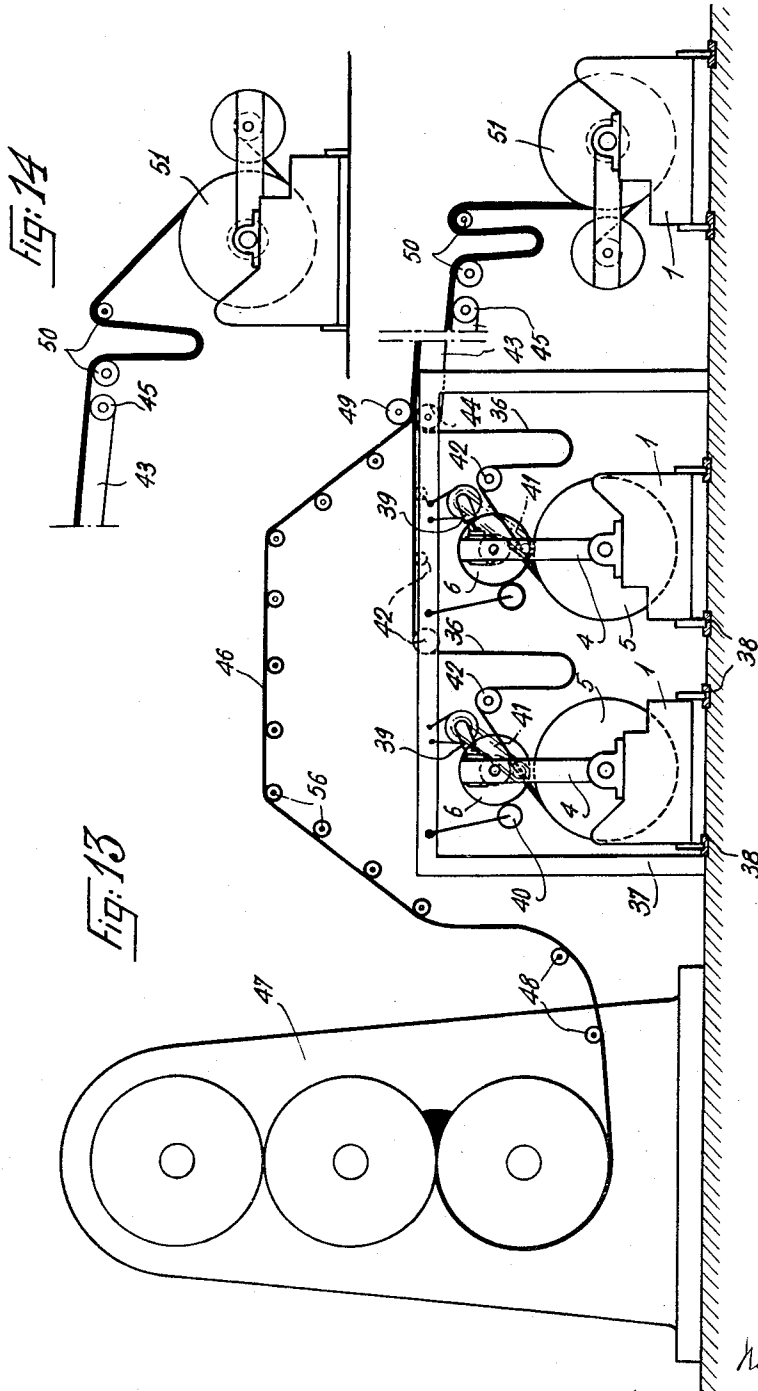
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APPARATUS FOR HANDLING PLIES OF RUBBERIZED FABRIC AND THE LIKE

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Filed Mar. 3, 1958, Ser. No. 718,662

7 Claims. (Cl. 242—67.3)

This invention relates to the handling and storing of 10 sheet material such as plies of rubberized fabric. The invention is more especially concerned with the handling of such rubberized fabric constituting the plies of pneumatic tires for vehicles during the fabrication of the tires.

In storing such rubberized sheets or plies and supplying the stored sheets to respective apparatus during the various steps of a tire manufacturing process, reeling machines are used which essentially comprise a pair of rotatable drums having parallel spaced axes, and the opposite ends of a flexible strip, e.g. of fabric or other suitable flexible material, of a length corresponding to that of the sheet or ply to be stored on the reeling machine, are attached to the peripheries of the respective drums. In the empty condition of the reeling machine the full length of the flexible strip is wound about one of the drums, which may be termed the auxiliary drum of the reeling machine. The sheet or ply is then wound about the other or main drum, and, simultaneously, the strip is reeled off the auxiliary drum so that its successive turns become interposed 30 between the turns of the sheet thereby preventing adhesion between the adjacent rubberized faces thereof. When the sheet is reeled off the main drum in order to be fed to some output machine, the strip is simultaneously reeled off the main drum and is taken up around the auxiliary drum of the reeling machine.

Conventional reeling machines of this kind have been found to exert a substantial amount of distorting and damaging action on the rubberized sheets during the reeling operations and it is one object of this invention to eliminate or minimize such distortion and damage. Another object is to facilitate the reeling-off step in reeling machines of the specified type.

In a reeling machine constructed according to the invention there is provided a support for the auxiliary drum which is pivoted about the axis of the main drum, whereby the possibility is provided of placing the auxiliary drum in any convenient position as may be required both during the loading of the reeling machine and during the discharge of the sheet therefrom.

Thus there may be provided a loading position wherein both drums have their axes positioned substantially in a common horizontal plane, and a reeling-off position in which the auxiliary drum has its axis positioned substantially in a common vertical plane with that of the main drum.

Damping means are preferably associated with the machine to facilitate swinging the auxiliary drum between its upstanding and its horizontal positions without requiring excessive power to be developed.

A reeling machine according to the invention may further include mechanism for rotating either drum by connecting it to a drive shaft and means for applying brake action to that drum which is not being driven.

Improved means are further preferably provided for positioning and centering the reeling machine drums in respect to output apparatus.

Further objects of the invention are to provide various improvements in apparatus associated with reeling machines of the class specified above.

The above and further objects, features and advantages of the invention will become fully apparent from a study

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of the ensuing description given by way of illustration but not of limitation and with reference to the accompanying drawings wherein:

FIG. 1 is a side elevational view of a reeling machine according to the invention;

FIG. 2 is a corresponding front view;

FIG. 3 is a plan view thereof;

FIG. 4 is similar to FIG. 1 but illustrates the reeling machine in the loading condition;

FIG. 5 is a corresponding view in plan;

FIG. 6 is an elevational view of one of the arms supporting the auxiliary drum;

FIG. 7 is a section on line VII—VII of FIG. 6;

FIG. 8 is a sectional view of a coupling arm;

FIG. 8a shows a reeling machine according to this invention associated with an apparatus with which it is to be employed for reeling a ply of material;

FIG. 9 is a diagrammatic illustration showing the manner in which a sheet or ply is wound in one direction on the reeling machine;

FIG. 10 is a corresponding plan view;

FIG. 11 is similar to FIG. 9 but illustrates winding of a ply in reverse direction;

FIG. 12 is a corresponding view in plan;

FIG. 13 is a diagrammatic view of a machine according to the invention for producing a twofold rubber-coated ply with the winding effected in one sense; and

FIG. 14 is a partial view similar to FIG. 13 with the winding effected in the reverse sense.

In the form of embodiment of the invention illustrated in FIGS. 1 to 7, the machine comprises a frame 1 mounted on rollers 2 whereby the machine can be readily wheeled to convenient positions adjacent to any of various units of apparatus with which it is to be utilized.

The frame 1 comprises a transverse shaft 3 journaled in it and supporting a main drum 5. Pivoted on the frame coaxially with shaft 3 are side arms 4 between the upper ends of which an auxiliary drum 6 is journaled. Secured to one of the arms 4 is a sector coaxial with shaft 3 and formed with angularly spaced notches 4a selectively engageable by a claw 7 projecting from a spring-biased foot-lever 7a pivoted on the frame 1, whereby the arms are adapted to be selectively retained in either a vertical or a horizontal position. On depressing foot-lever 7a, the claw 7 may be disengaged from the corresponding notch 4a and the arms may be swung about shaft 3. In order to allow the arms to be swung by hand in spite of their weight, a resilient damping mechanism is associated with said arms; said mechanism comprises a link 8 having one end pivoted to the arm and its other end connected by way of a pin-and-slot connection 9 with a bell-crank lever 10. Lever 10 has a tension spring 11 attached to one arm 10a of the lever the other end of the spring being anchored as shown to a link operated by the foot-lever 7a, and the other arm 10b of lever 10 is pivoted to one end of a telescopic damper unit 12 the other end of which is pivoted to frame 1.

When the auxiliary drum 6 is swung down to the horizontal position shown in FIGS. 4 and 5 the swinging movement is retarded by damper 12, while the spring 11 is placed under tension thereby storing potential energy which will later be given up to assist in the upward swinging movement when the auxiliary drum is raised to its vertical position shown in FIG. 1.

Provided on opposite sides of each arm 4 near the outer end of it are a pair of positioning lugs 4b (see FIGS. 1 and 2) in which vertical grooves 4c are formed adapted to cooperate with complementary projections (such as guide members 39 on FIGURE 13) provided on the machines with which the reeling unit is to be associated.

A strip 13 of flexible material such as fabric has its ends respectively attached to the periphery of the body

5a of the main drum 5 and to the periphery of the body 6a of auxiliary drum 6.

As will be more clearly apparent from FIGS. 6 and 7 each arm 4 is provided with means for selectively driving and braking either one of the drums. The means essentially comprise a pair of coupling members 14 and 15, e.g. the female coupling members of respective pin-and-hole couplings. Projecting flanges 16 of the arms serve to protect said coupling members. Secured on coupling member 14 is a gear 17 which meshes with a central gear 18 rotatable with the body 6a of the auxiliary drum 6. Coupling member 15 carries a sprocket gear 19 and a corresponding sprocket gear 20 is rotatable with the body 5a of the main drum 5. A sprocket chain 22 is trained about both sprocket gears and about a third sprocket gear 21 adjustably positioned on the arm 4 for controlling the tension of the sprocket drive.

Either of the drums can be driven in rotation or can have its rotation retarded, as may be desired, by mounting a male coupling member complementary to members 14 and 15, in engagement with a selected one of the female members on a convenient one of the arms 4, and connecting the male coupling member to a drive shaft or to a retarding device as the case may be. This can be accomplished both when the auxiliary drum is in its raised position and in its lowered position. FIG. 8 illustrates one form of assembly which can conveniently be used for the purpose just mentioned.

Referring to FIG. 8, the reference 23 designates a portion of the frame of any unit of apparatus with which the reeling machine of the invention may have to be associated for reeling a ply of material on or off the unit. Journalled in frame portion 23 is an outwardly projecting stubshaft 24 having a swinging arm 25 secured to its outer end. Rotatably mounted on the end of shaft 24 is a sleeve 26 having a sprocket 27 formed on its inner end of a pulley or drum 28 formed on its outer end. Journalled in the free end of the arm 25 is a shaft 29. On one end of this shaft a male coupling member 30 is secured complementary to both female coupling members 14 and 15. The shaft 29 is slidable a limited amount in the arm 25 and has secured on its end remote from member 30 a grooved pulley 31 which can be selectively positioned with the shaft 29 so that its groove is engaged by either of two claws 32a and 32b projecting from a lever 32 pivoted to arm 25, whereby the coupling member 30 is selectively moved to its idle or retracted position shown in full lines or to its engaging position shown in chain lines. A knurled knob shown as secured to the left hand end of the shaft may serve to shift the shaft between its position.

A longitudinal keyway 30a is formed in the shaft 29 and a sprocket 33 is slidably mounted on the shaft within the arm 25 in general alignment with the sprocket 27, a key 33a of sprocket 33 engaging the keyway 30a. Thus the sprocket 33 is connected for rotation with the shaft 29 without preventing the shaft 29 being axially shifted in the manner described. A pair of opposite steps 34 projecting from arm 25 serve to restrain sprocket 33 against axial displacement from its aligned position with sprocket 27. Sprockets 27 and 33 are connected by a sprocket chain not shown.

In order to drive either one of the drums 5 and 6 in rotation, the arm 25 is swung to a position in which the coupling member 30 is positioned in register with the coupling member 14 or 15 corresponding to the particular drum 5 or 6, respectively, that is to be controlled. The shaft 29 is shifted to its advanced position so that male coupling member 30 engages the selected female member, and the pulley 28 is driven in rotation as by a suitable belt drive or other means. Similarly in order to retard the rotation of either of the drums, a similar mechanism may be used wherein, a braking force is applied to the pulley 28 which serves as a brake drum.

FIG. 8a shows an apparatus according to the invention associated with a structure 23 which links a mechanism as shown in FIG. 8. On the left side of FIG. 8a, the device is arranged for braking the auxiliary drum 6. The coupling member 30 is connected to the coupling element 14 of the arm 4 with the shaft 39 and the pulley 31 in the operative position (such being shown in phantom lines in FIG. 8). A brake band 52, the ends of which are carried by supporting bars 53, is passed over the pulley 28 for applying the braking force.

On the right side of FIG. 8a, the device is arranged for driving the main drum 5. The coupling member 30' is connected to the coupling member 15 and the shaft 29' and pulley 31' are in the operative position. A driving belt 54 is passed around the pulley 28'.

The shaft 24, connecting both mechanisms to the structure 23, has guide members or positioning arms 39 engaged with the positioning grooves 4b of the arms 4 within the grooves 4c for the purpose of centering the apparatus with respect to the frame. In the present example, the frame is that of a source 35 of sheet material as shown in FIG. 9.

The apparatus occupies a filling position wherein the auxiliary drum lies beside the main drum. The main drum is driven by means of the pulley 28' and the coupling member 15, whereas the auxiliary drum is braked by means of the pulley 28 and a coupling member 14.

FIGS. 9 to 12 illustrate the operation of the improved machine in reeling a rubber-coated ply. In FIGS. 9 and 10 the auxiliary drum 6 is shown swung to its lowered position to the left of the main drum 5, and the flexible strip 13 is shown as completely wound up on the drum 6 in a counterclockwise direction on the figure. The reeling machine is assumed to be positioned adjacent to a joining table 35 from which a ply 36 is being delivered over feed or guide rollers such as 35a. The ends of the ply are cut diagonally in the usual manner, with the usual parallel spaced threads of the rubberized fabric of the ply directed as indicated at 36a in FIG. 10. The outer end 36b of the ply is inserted between the body 5a of the main drum 5 and the corresponding end portion 13a of the strip 13. Either one of the female coupling members 15 is then connected with a drive means in the manner described above so as to rotate the main drum 5 in the direction indicated by the arrow in FIG. 9, while simultaneously a female coupling member 14 is connected with braking means also in the manner described.

In this condition the ply 36 and strip 13 are simultaneously wound about the main drum 5. After a length of ply corresponding to the total length of strip 13 has been reeled up, the drive of drum 5 is arrested, both the drive and brake couplings 14 and 15 are disconnected, the ply is cut off and the drum 6 is swung to its raised position. The reeling unit of the invention is now in loaded condition and is ready for use in feeding the ply stored therein to a subsequent stage of the tire manufacturing process.

In most tire assemblies the plies are crossed, that is, the threads in adjacent plies are angled oppositely and symmetrically to either side of the midplane of the tire. Hence reeling machines are required to be available wherein plies are reeled in both opposite senses. Hence, FIGS. 11 and 12 illustrate the manner in which my improved reeling machine can be operated for reeling a ply in the reverse sense from that shown in FIGS. 9 and 10.

Referring to FIGS. 11 and 12 the reeling unit 1 is shown positioned adjacent to the joining table 35 in a reverse condition from that shown in FIG. 9, so that auxiliary drum 6 when swung to its horizontal condition is positioned away from the table 35, rather than toward said table as in FIG. 9. The main drum 5 is driven in the opposite sense as shown by the arrow in FIG. 11 and it will be readily apparent that the ply is now reeled up

on drum 5 in FIG. 12 in the reverse sense from that in FIG. 10.

A reeling machine according to the invention may be used in connection with multiple or manifold plies, e.g. twofold plies. One form of apparatus for providing manifold plies is illustrated in FIGS. 13 and 14. The apparatus includes as many elementary reeling units of the type described above as there are individual plies to be provided in the manifold assembly, e.g. two as shown. The apparatus comprises a frame 37 and tracks 38 upon which the rollers 2 of the reeling units are arranged to travel. Guide members 39 of the frame are adapted to cooperate with the centering surfaces 4b, 4c provided on the arms 4 as earlier described. Friction rollers such as 40 are provided for engaging the flexible strips wound about the auxiliary drums 6 to assist in reeling off the plies. Drive and braking arms which may be similar to the arms 25 described with reference to FIG. 8 are illustrated at 41. Feed and guide rollers such as 42 are provided for feeding the ply 36 from each reeling unit to a conveyer belt 43 trained about end rollers 44 and 45. The two plies 36 are deposited on the conveyer belt 43 in superimposed relation.

A continuous band or strip of gum 46 is fed out of a suitable calendar unit 47 and is led by way of feed and guide rollers such as 48 and 56 to the conveyer 43 so as to be deposited over the plies 36 at a point adjacent to the near end roller 44 of the conveyer. A presser roller 49 is provided for applying and bonding the raw gum strip 46 to the plies 36.

The resulting composite sheet issuing from the outlet of conveyer 43 is passed over rollers 50 and is stored on a receiving reeling machine 51. The two constituent plies in the composite sheet reeled on output unit 51 may have their threads extending in a common direction. In such case, depending on the manner in which the output unit 51 is disposed relatively to the frame 37, i.e. in the manner shown in FIG. 13 or the manner shown in FIG. 14, the resulting twofold ply may be stored for subsequent delivery with the threads thereof directed left or right, as earlier explained.

Manifold plies of the kind thus produced may serve to fabricate improved reenforced tire casings, using for example an appropriate machine including two or more, e.g. four, feed-out reeling units.

What I claim is:

1. An apparatus for handling plies of sheet material of the type described, comprising in combination a frame, a main drum journaled in the frame about a first axis, an auxiliary drum journaled about a second axis parallel to and spaced from said first axis, means for supporting said auxiliary drum for rotation about said second axis, said supporting means being journaled about said first axis, means for selectively locking said supporting means in a first and second position relative to said frame, said first position comprising a lowered loading position and said second position comprising an elevated unreeling position wherein a plane passing through said first and second axes in said elevated position is at a substan-

tial angle to a plane passing through the first and second axes in said lowered loading position, the main drum being lowermost in said second position, the center of gravity of said main drum being substantially on said first axis, whereby to facilitate the upward rotation of said supporting means to said second position, a flexible strip having opposite ends secured to the respective drums, and individual coupling means operatively associated with each of said drums for selectively allowing driving and braking of said drums.

2. The combination of claim 1, wherein means are provided for resiliently damping the movement of said supporting means between said first and second positions.

3. An apparatus for handling plies of sheet material of the kind described, comprising in combination a frame, a main drum journaled in said frame about a first axis, a pair of arms journaled about said axis on each side of said drum, respectively, an auxiliary drum journaled between said arms and rotatable about an axis at a distance from and parallel to said first axis, means for selectively locking said arms in a first and second position relative to said frame, a flexible strip having opposite ends secured to the respective drums, a first coupling member provided on each of said arms coupled to said main drum, and a second coupling member provided on each of said arms coupled to said auxiliary drum, whereby said main and auxiliary drums may be selectively rotated and braked by selectively applying a driving or a braking force to the coupling member of the respective drum.

4. The combination of claim 3, further comprising a link pivoted to each of said arms, a bellcrank lever pivoted on said frame and one arm of which is pivoted to said link, a tension spring having opposing ends, one of said ends being attached to said frame and the other end being attached to said arm of said bell-crank lever, and a damping device having opposing ends which are respectively attached to the other arm of said bell-crank lever and to said frame.

5. An apparatus as claimed in claim 3, adapted to be used with a source of said plies of sheet material and with a machine to be fed with said plies, wherein said arms are provided with positioning lugs adapted to be engaged with pairs of spaced cooperating members on said machine.

6. The combination of claim 5, wherein said frame is provided with wheels, said first axis being located in said frame in a horizontal position and wherein in said first position, said auxiliary drum is located on one side of said main drum, whereas in said second position, it is located above said main drum.

7. The combination of claim 5, wherein said first and second coupling members are identical with each other.

References Cited in the file of this patent

UNITED STATES PATENTS

653,583	Moore et al.	July 10, 1900
1,120,520	Nall	Dec. 8, 1914
1,506,437	Midgley	Aug. 26, 1924