

Sept. 8, 1936.

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2,053,296

WINDER

Filed May 4, 1934

6 Sheets-Sheet 1

Fig. 1.
DIRECTION OF TRAVEL:
AWAY FROM OBSERVER

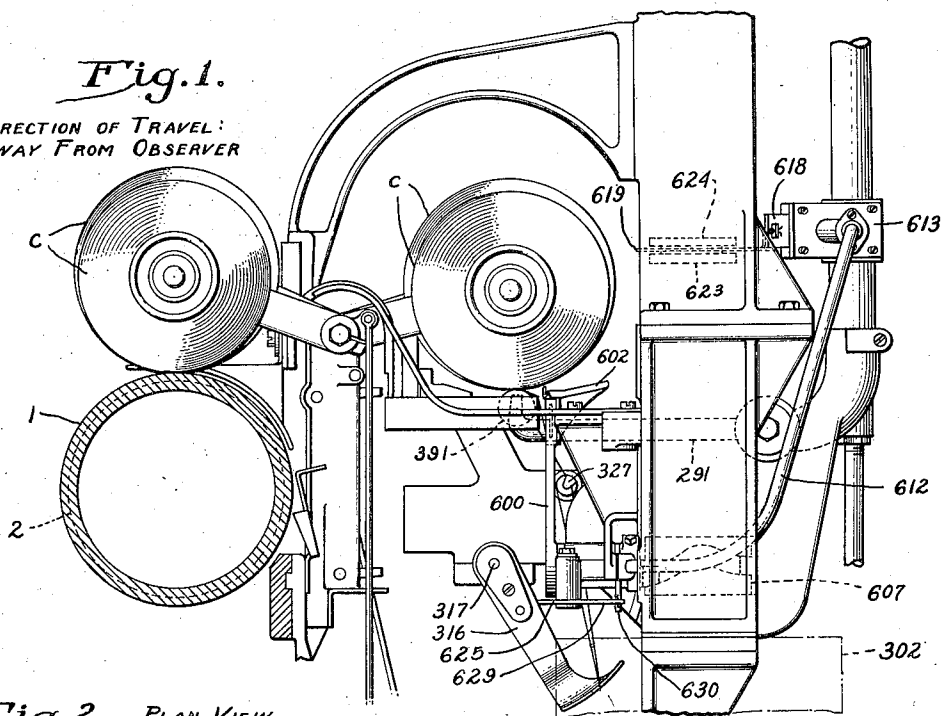
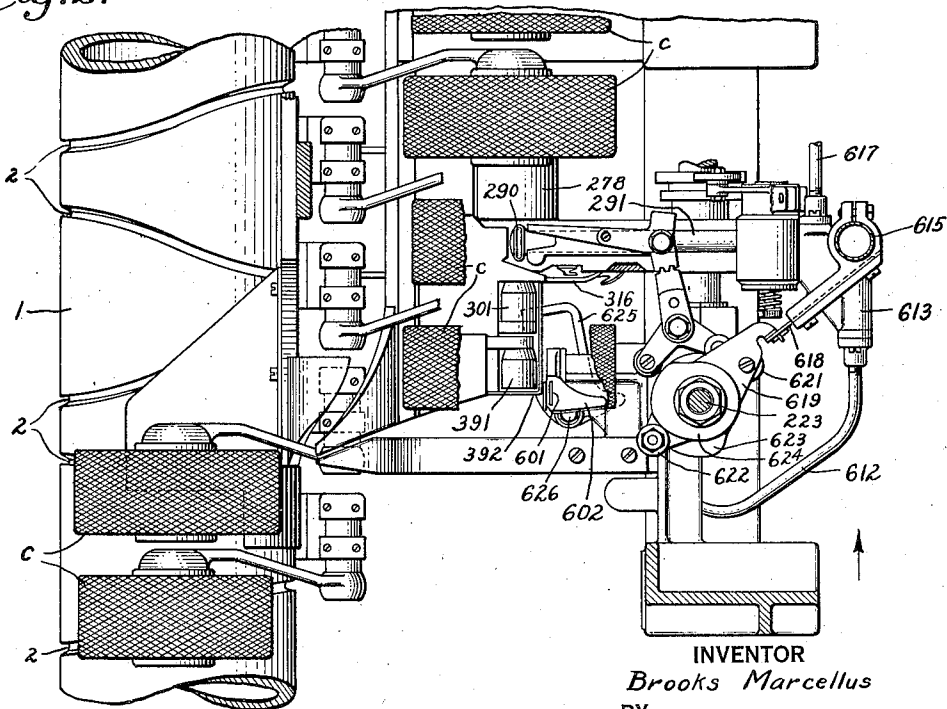


Fig. 2. PLAN VIEW



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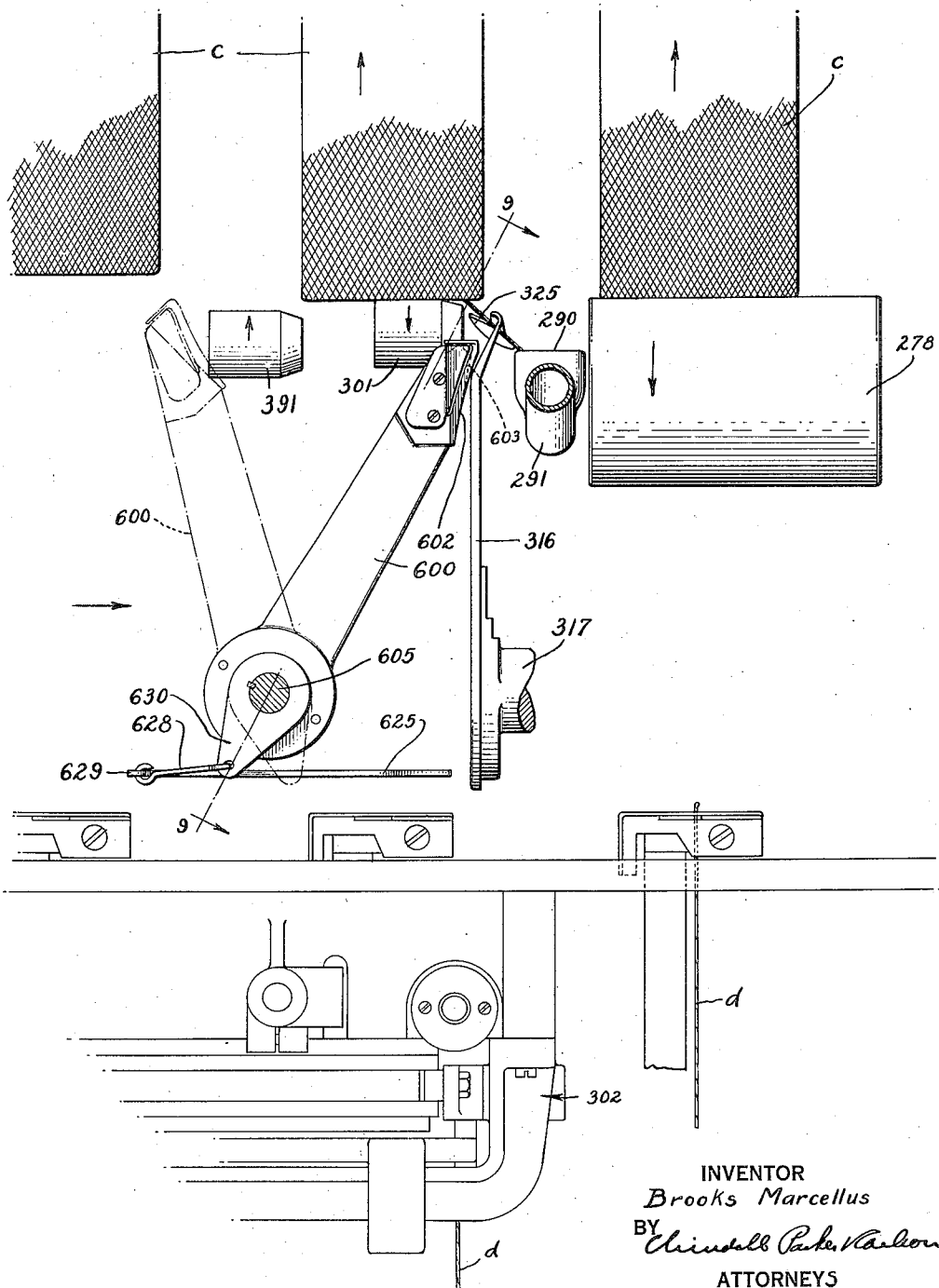
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Fig. 3.



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Fig. 4.
FRONT VIEW

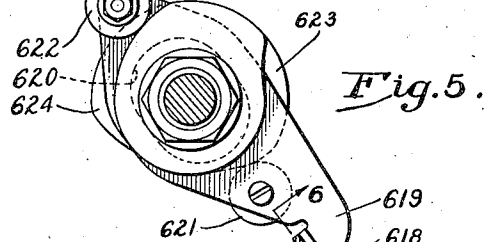
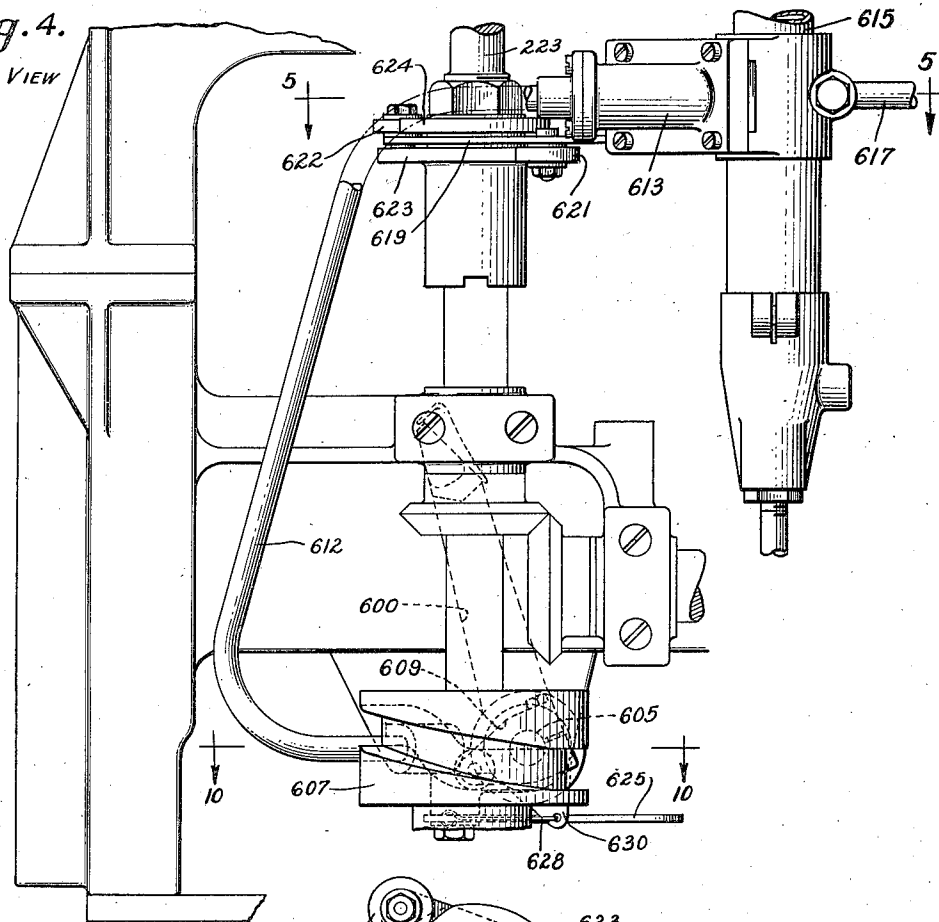
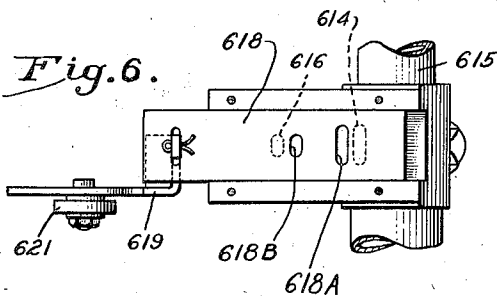


Fig. 6.



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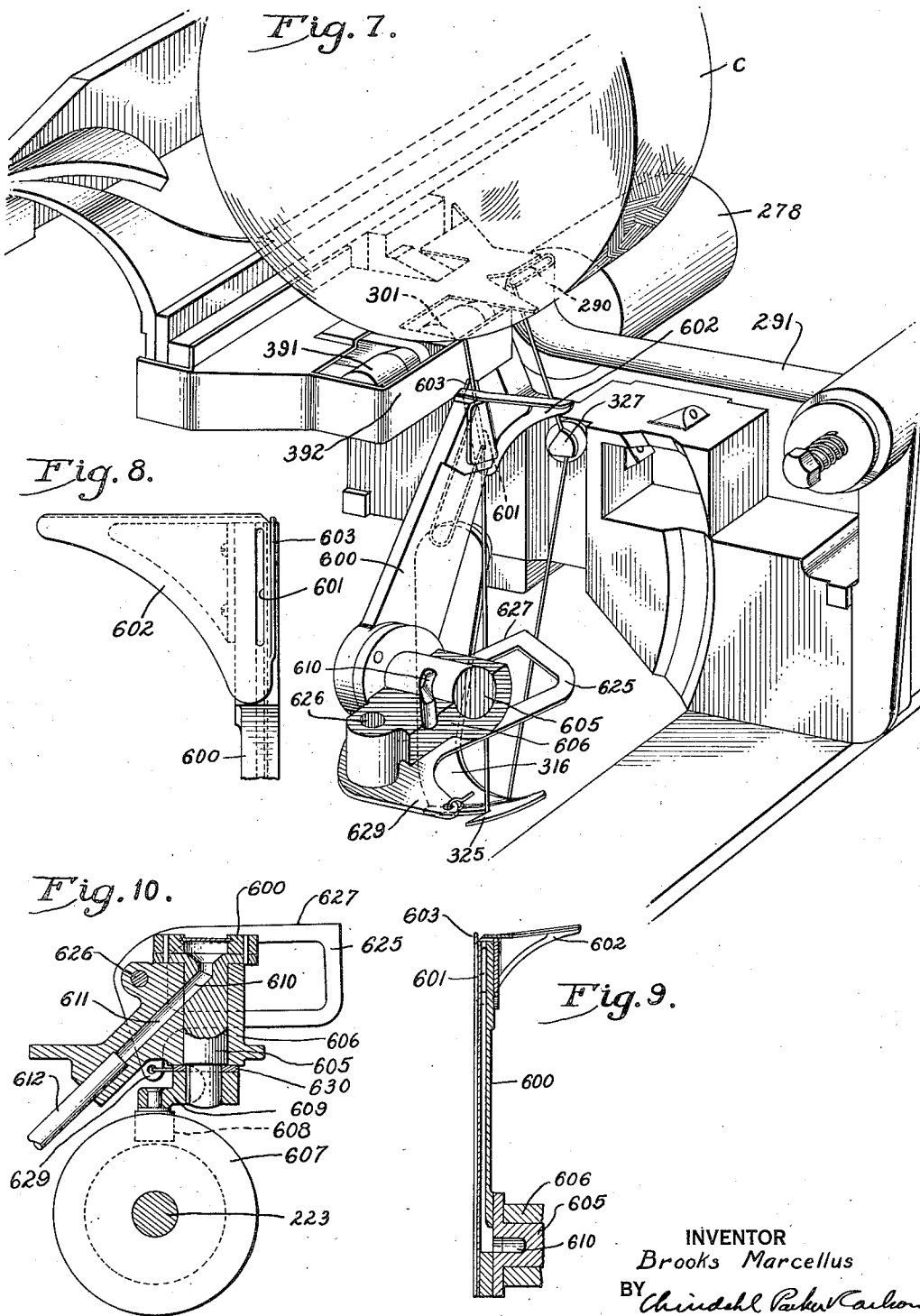
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Sept. 8, 1936.

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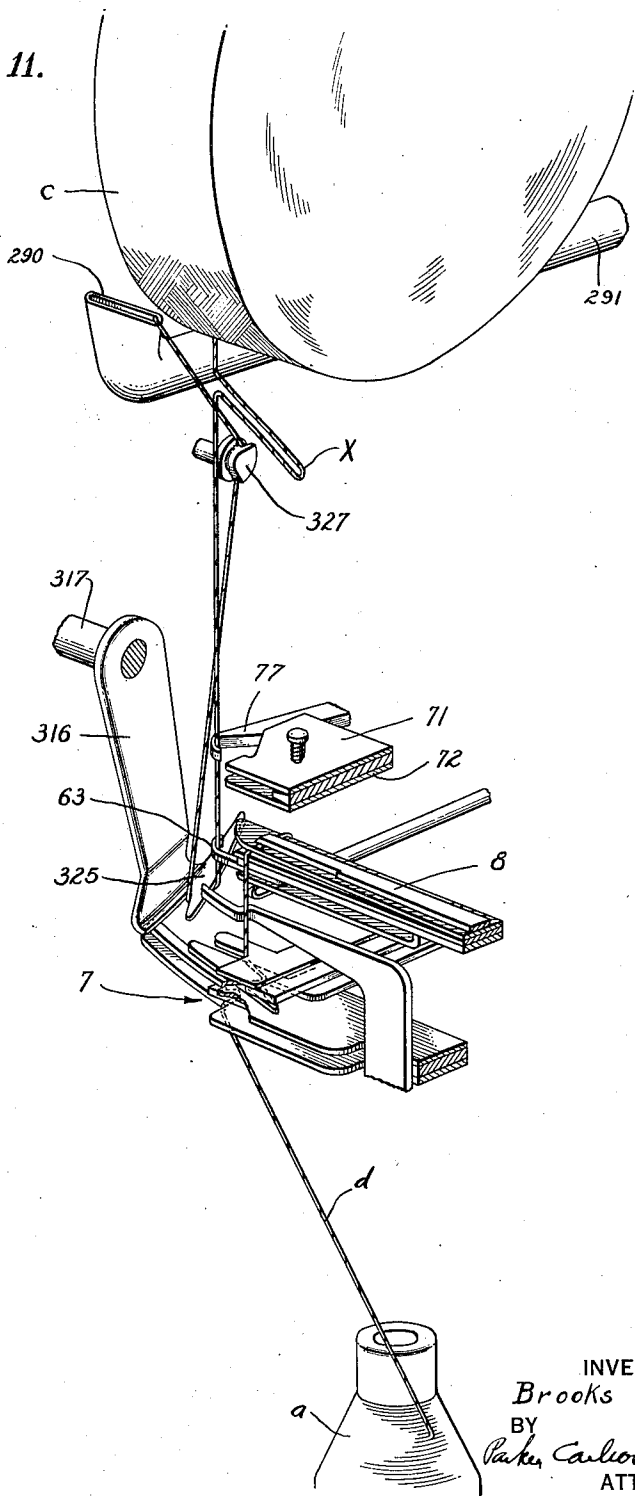
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Fig. 11.



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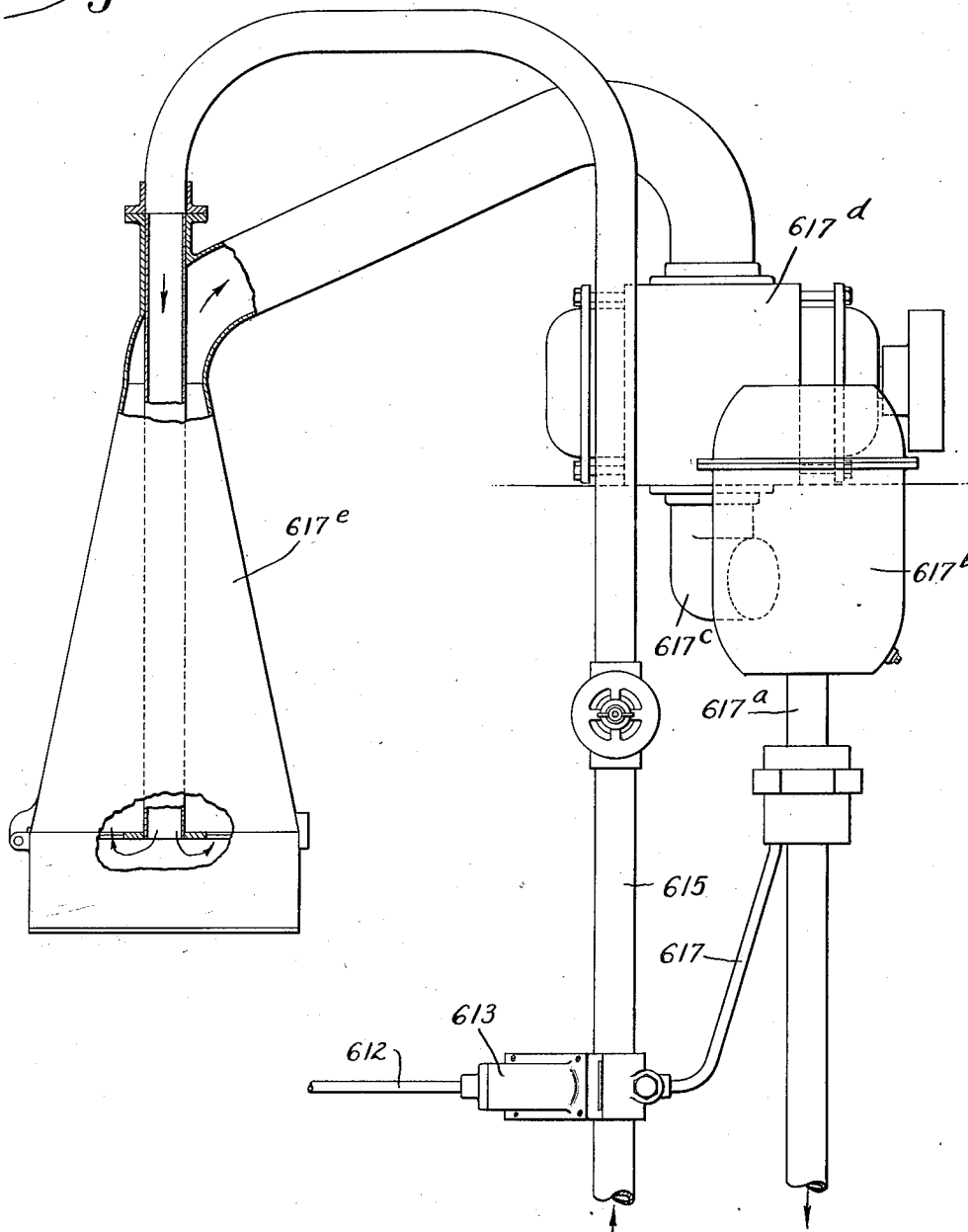
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Fig. 12.



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UNITED STATES PATENT OFFICE

2,053,296

WINDER

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Application May 4, 1934, Serial No. 723,851

20 Claims. (Cl. 242—35.6)

This invention relates to an improvement in winders of the general type exemplified by the Colman Patent No. 1,267,977, dated May 28, 1918. The mechanism disclosed in that patent comprises a mechanically actuated grid for maintaining the yarn in proper relation to the cheese and for taking up slack in said yarn. It is impracticable to construct and operate such a device so as to handle the yarn with the requisite certainty without danger of placing excessive tension upon the yarn, and, as a consequence, yarn breakage has sometimes resulted.

The present invention aims to prevent such breakage, and this aim has been attained by the substitution of means employing an air current in place of the mechanically actuated grid. The improved means has not only remedied the difficulties heretofore experienced, but has made possible a substantial increase in the speed of operation of the machine with a consequent increase in production.

Another object of the invention is to provide means for disengaging the yarn from the knoter.

In the accompanying drawings,

Figure 1 is a fragmental vertical view of a winder embodying the features of my invention. Fig. 2 is a fragmental plan view.

Fig. 3 is a vertical view, more or less in outline, looking from the front of the machine.

Fig. 4 is a fragmental front view of the traveling mechanism of the winder.

Fig. 5 is a horizontal sectional view taken in the plane of line 5—5 of Fig. 4.

Fig. 6 is a fragmental vertical section taken in the plane of dotted line 6—6 of Fig. 5.

Fig. 7 is a fragmental perspective view.

Fig. 8 is a view of the upper end of the suction tube 600.

Fig. 9 is a longitudinal sectional view of said suction tube.

Fig. 10 is a horizontal sectional view on line 10—10 of Fig. 4.

Fig. 11 is a perspective view showing the relationship between various parts that operated upon the two threads which are to be united.

Fig. 12 is a view of the source of supply of air under pressure.

I have herein shown my invention as embodied in a machine of the general type shown in the beforementioned Colman Patent No. 1,267,977 and reference may be made to said patent for an understanding of various details not herein illustrated or described. It will be understood,

however, that the present invention is not limited to machines of this specific character.

The winder may be considered as comprising a plurality of units, each unit having means for supporting a bobbin *a* (Fig. 11) and a cross-wound yarn-mass or cheese *c*, the cheese being revolved by a drum 1, and the yarn being traversed by a cam groove 2 in the drum. The winder further comprises a mechanism arranged to travel along the winding units and tie the ends of the yarn on the bobbins to the ends of the yarn on the cheeses, and perform various other operations attending the production of cheeses. The winder-tending mechanism travels around the winder and ties the end of the yarn *d* (Figs. 3 and 11) on a reserve bobbin to every cheese, except in the case of cheeses that have reached the desired size. As the winder-tending mechanism progresses, it places each thrown-out cheese in succession upon an end-finding device forming a part of the winder-tending mechanism. Said device comprises a roll 278 on which the cheese rests and whereby the cheese is revolved in the direction to unwind yarn from the cheese. At the rear end of the roll 278 is located the suction opening 290 of a suction tube 291 (see the Colman Patent No. 1,661,817, dated Mar. 6, 1928). As the winder-tending mechanism advances, the mouth 290 arrives under the cheese. As the latter is being revolved by the roll 278, the free end of the yarn on the cheese is drawn into the mouth 290.

Before the roll 278 has passed completely out from under the cheese, another roll 301 passes under the cheese, the rolls 278 and 301 revolving in the same direction and their upper sides being in the same horizontal plane.

The knot-tying mechanism 302 (Fig. 3) may be of any desired character, but preferably is of the weavers' knoter type disclosed in the Peterson Patent No. 1,657,407, dated Jan. 24, 1928, and shown in Fig. 11 herein. Using the same reference numerals as are employed in the Peterson patent in describing the knoter, 7 and 8 are the lower and upper clamps, respectively, for the reserve thread *d*; 63 is a hooked member forming part of a device for clamping and severing the cheese thread; and 71, 72 and 77 constitute another clamp for the cheese thread, the part 77 being in the form of a hook to receive said thread.

The means for carrying to the hooks 63 and 77 of the knot-tying mechanism the thread that has been picked up by the suction tube 291 comprises an arm 316 fixed to one end of a rock 55

shaft 317. On the free end of the arm 316 is a hook 325 (Figs. 7 and 11) to engage the portion of the thread extending from the suction opening 290 to the cheese. As the arm 316 swings downwardly, it carries a bight of the thread to the knot-tying mechanism, slack being furnished by the unwinding of the cheese due to the rotation of the roll 301. If desired, the peripheral speed of said roll may differ from that of the roll 278, and it should be such that the cheese furnishes all of the thread for the loop or bight produced in the downward movement of the arm 316, no thread being drawn from the suction tube 291. As the arm 316 swings downwardly, the strand that extends between the suction tube 291 and the arm 316 is carried into a hook 327 (Fig. 7) which is fixed to the framework of the winder-tending mechanism. The suction current in the tube 291 keeps taut the strand extending from the cheese to said tube so long as said strand is not clamped at any point between the cheese and the tube.

As the arm 316 completes its downward movement, a slack take-up roll 391 passes into position below the cheese, said roll revolving in the direction opposite to the direction of rotation of the rolls 278 and 301. A guard plate 392 (Fig. 7) fixed in the framework of the traveling mechanism extends in front of the rolls 301 and 391. The strand extending between the cheese and the hook 325 runs over the upper edge of said guard plate. After the strand has been drawn down by the hook 325 said strand is clamped by the devices 63 and 77 and severed by said device 63, and tied to the thread of the reserve bobbin. By that time the roll 391 has caused the cheese to reverse its direction of rotation for the purpose of taking up slack in the united threads. However, the roll 391 cannot arrest the unwinding rotation of the cheese at an invariable point in the cycle, hence it is necessary to make other provision to take up slack in that portion of the strand which extends between the hook 325 and the cheese after said portion has been clamped in the clamps 63 and 77 of the knotter; in order to keep said portion substantially taut at all times so that it shall be under control and so that the thread shall not have an opportunity to kink after it has been clamped as aforesaid. It is also necessary to keep said strand in the vertical plane of the cheese as the winder-tending mechanism progresses. In the before-mentioned Colman Patent No. 1,267,977, the means provided for these purposes consisted of a mechanically-actuated grid formed of a thread-pushing plate (designated 415 in said Colman patent) and a pair of fingers (numbered 417 in said patent). I substitute for this mechanically-actuated grid a suction tube 600, the mouth of which is indicated at 601. The tube 600 swings in a vertical plane in front of and close to the guard 392, said vertical plane being parallel with the direction of travel of the winder-tending mechanism. The mouth 601 is formed in a plate 602 extending transversely of the tube toward the front of the machine. At the rear side of the mouth 601 the plate 602 has a guard flange 603.

As shown in Fig. 9, the body of the tube 600 is relatively thin or shallow. Thus, it will be seen that when the yarn is drawn into said tube in the form of a loop X (Figs. 7 and 11), the loop has space to remain in the form of an open or distended loop and that by reason of the thinness of the tube there is not space for such

loop to revolve, hence the loop remains distended and is not permitted to twist or kink.

The suction tube 600 is fixed to a pivot portion 605 which is mounted for pivotal movement upon a horizontal axis in a bearing 606 carried by the winder-tending mechanism. The tube 600 is swung in timed relation to the parts with which it cooperates by means herein shown as comprising a cam 607 which is engaged by a roller 608 carried by a crank arm 609 that is rigid with the pivot 605. The cam 607 is fixed to a continuously rotated shaft 223 which is driven as shown in Fig. 38 of the Colman Patent No. 1,267,977.

In the pivot 605 is a duct 610 (Fig. 10) which communicates in all positions of the pivot with a duct 611 in the bearing 606. The latter duct is connected to a tube 612 which extends to a valve casing 613 (Fig. 5). In the casing 613 is a duct 614 (Fig. 7) that serves to connect the tube 612 with an exhaust tube 615, and a duct 616 that connects the tube 612 with a tube 617 which extends to a chamber 617^a (Fig. 12). The latter tube extends to the outlet 617^c of a blower 617^d mounted on the traveling winder-tending mechanism. The inlet side of the blower is connected to the outlet of a separator chamber 617^e. The inlet of the separator is connected to the suction tube 615.

Communication between the tube 612 and the tubes 615 and 617 is controlled by means of a slide valve 618 having ports 618A and 618B therein. The slide valve 618 is reciprocated by means of a slide 619 attached to said valve, said slide having an elongated opening 620 in which lies a circular portion of the shaft 223. The slide 619 carries two rollers 621 and 622 that respectively engage cams 623 and 624 on the shaft 223.

In the following description of the operation, the term "cycle" is used to denote the series of operations that takes place for each winding unit of the winder, or, in other words, the series of operations that occurs while the winder-tending mechanism is travelling a distance equal to the distance between the vertical central planes of two successive cheeses *c* (Fig. 3). In each cycle, the shaft 223 makes one revolution, the down-take arm 316 makes one up and down movement, and the tube 600 makes one to-and-fro movement.

Referring now to Fig. 3, which shows the down-take arm 316 as about to catch the yarn in its hook 325 and swing forward toward the reader and down to the knotter: As the yarn is drawn down by the down-take arm 316, the strand that extends between the hook 325 and the cheese is laid over the mouth 601, as will be understood from Figs. 3 and 7. After the lower portion of the strand has been clamped in the clamps of the knot-tying mechanism, slack in said strand is drawn into the tube 600. The suction tube 600 then swings in the direction opposite to the direction of travel of the winder-tending mechanism, the first portion of this movement being relatively rapid so as to guide the yarn onto the center of the cheese. This movement takes place during the period between 7° and 17° in the cycle. During the period from 17° to 178° (the united threads being released from the knotter at about 80° or 90°), the end of the suction tube 600 continues to move in the direction opposite to the direction of travel of the winder-tending mechanism, but at the same speed so as to remain stationary with reference to the cheese and close to the surface of the cheese. During the period from 178° to 238°, the suction tube re-

mains stationary in its rearmost position, and during the period from 238° to 298° it swings forward to its farthest forward position to receive another strand of yarn from the next cheese.

- 5 Usually the slack in the tube 600 has been entirely withdrawn by means of the roll 391 by the time the 180° point in the cycle is reached, but occasionally there is excessive slack which leaves some yarn in the tube at that time.
- 10 Referring now to the time relation between the slack-take-up tube 600 and the valve 616: The valve opens communication between the slack-take-up tube 600 and the exhaust tube 615 while the slack-take-up tube is moving forward to receive a strand of yarn. The full suction continues while the mouth 601 is moving backwardly until about 110°. The valve then partially closes. Between 180° and 220° (the mouth being then stationary in its rear position) the air current changes from suction to an air blast, whereby air is supplied to the tube 600 to blow out the strand of yarn, if not already withdrawn by the roll 391. The air blast continues from 220° to 278° and then changes to suction, which continues from about 278° to 318°.

- A further feature of novelty in the present construction consists of means for disengaging the united threads from the knotter. The knotting mechanism shown in the Peterson Patent No. 1,657,407 includes a projecting portion against which the thread may hang after the formation of the knot. Heretofore the movement of the thread toward the winding drum 1, as the cheese is returned to the drum, has been depended upon to draw the thread away from this projection. However, the thread has occasionally failed to be disengaged. I therefore provide an arm 625 pivoted at 626 to swing in a horizontal plane. The rear edge 627 is arranged to swing against the strand extending between the cheese and the knotter and push said strand rearwardly clear of the projection above referred to after said strand has been tied to the reserve thread.

- The means for swinging the arm 625 in proper timed relation to the knotter comprises a link 628 extending between a projection 629 on the arm 625 and an arm 630 fixed on the pivot or shaft 605.

- It will be seen that I have substituted for the mechanically-actuated slack-take-up grid of the prior art a suction tube which handles the yarn gently and yieldingly, but with the necessary certainty and definiteness. In addition, I have provided a new feature, that of disengaging the strand from the slack-take-up means after the knot has been tied. In the prior art, there was no means for throwing off the yarn from the slack-take-up. If the yarn failed to become free from the slack-take-up, the yarn would break. The end attached to the cheese would be wound up on the cheese, but the end attached to the bobbin might be dragged along by the winder-tending mechanism and be carried into engagement with one or more of the threads of other units and eventually cause these threads to break down, or if the thread of such other unit did not break, the thread dragged along by the winder-tending mechanism might become engaged with such other thread and both be wound together on the cheese. The thread dragged along by the winder-tending mechanism might also cause the thread of another unit to leave the cam groove of the cheese-rotating drum and thus cause the thread to be wound circularly around the cheese instead of spirally.

The terms "yarn" and "thread" are used herein interchangeably and to denote any analogous material.

I claim as my invention:

1. The combination of a cheese-winding unit, a carriage arranged to travel past said unit, a pneumatic tube mounted on said carriage to swing in a direction approximately parallel to the direction of travel of said carriage, the mouth of said tube being adapted to engage the thread of the unit, and means for swinging said tube to keep the portion of said thread which is between the cheese and said tube in the vertical plane of the cheese.
2. The combination of a winder unit and mechanism arranged to travel past said unit to unite the exhausted and a reserve thread, said mechanism comprising means for keeping the united threads in the vertical plane of the unit, said means comprising a pneumatic tube arranged to swing in a direction approximately parallel to the direction of travel of said mechanism.
3. The combination of a winder unit and mechanism arranged to travel past said unit to unite two threads, said mechanism comprising means for keeping the united threads in the plane of the unit, said means comprising a pneumatic tube arranged to swing in a direction approximately parallel to the direction of travel of said mechanism, the mouth of said tube being arranged to receive one of said threads.
4. The combination of a winder unit and mechanism arranged to travel past said unit to unite two threads, said mechanism comprising means for keeping the united threads in the plane of the unit, said means comprising suction means arranged to move in a direction approximately parallel to the direction of travel of said mechanism.
5. A winder having, in combination, a carriage, a knotter mounted on the carriage for uniting two threads, yarn-mass-rotating means on the carriage for taking up slack in the united threads, and pneumatic means on the carriage located between the knotter and the yarn-mass-rotating means to take up slack in one of the threads.
6. A textile machine having, in combination, a knotter for uniting the threads of two yarn masses, a roll for supporting and rotating one of the yarn masses to take up slack in the united threads, and a suction tube located between the knotter and the roll to draw the thread of the last-mentioned yarn-mass into said tube and thus take up slack in said thread.
7. A winder having, in combination, a carriage, a knotter mounted on the carriage for uniting the threads of two yarn masses, means on the carriage for rotating one of the yarn masses in the unwinding direction, and a suction tube on the carriage arranged to draw the thread of the last-mentioned yarn mass into said tube and thus take up slack therein.
8. A winder comprising, in combination, a winding unit, a carriage arranged to travel past said unit, means on said carriage to draw a thread of said unit into position for operation thereon, and a pneumatic tube mounted on said carriage to receive said thread and move it in the direction opposite to the direction of travel of said carriage.
9. A winder comprising, in combination, a winding unit, a carriage arranged to travel past said unit in a horizontal plane, means on said carriage to draw a thread of said unit downwardly, a pneumatic tube movably mounted on said carriage to receive said thread and move it in the direction

opposite to the direction of travel of said carriage, and means for reversing the direction of flow of air in said tube to eject the thread.

- 5 10. A winder comprising, in combination, a winding unit, a carriage arranged to travel past said unit, means on said carriage to draw a thread of said unit into position for operation thereon, pneumatic means mounted on said carriage to receive said thread and move it in the direction op-
- 10 posite to the direction of travel of said carriage, and means for reversing the direction of flow of air in said means to eject the thread.
- 15 11. A winder having, in combination, means for rotating a yarn mass in the unwinding direction, a suction tube arranged to draw the thread of said yarn mass in the form of a loop into said tube and thus take up slack therein, and means for reversing the flow of air in the tube to eject the loop.
- 20 12. A winder having, in combination, means for extending a thread from its mass, a suction tube arranged to draw the thread into said tube in the form of a loop and thus take up slack therein, and means for reversing the flow of air in the tube to eject the loop.
- 25 13. A winder having, in combination, a carriage, a knotter mounted on the carriage for uniting the threads of two yarns masses, means on the carriage for extending the thread of one of the yarn masses, and means on the carriage arranged to take up slack in said thread, said last-mentioned means being arranged to throw off said thread after the two threads have been united.
- 30 14. The combination of a winder unit and mechanism arranged to travel past said unit to unite the exhausted and a reserve thread, said mechanism comprising means for keeping the united threads in the vertical plane of the unit, said means comprising a suction tube arranged to swing in a direction approximately parallel to the direction of travel of said mechanism and to receive one of said threads, and means for reversing the flow of air in said tube to disengage said thread from the tube.
- 35 15. In a textile machine, a pneumatic tube to draw in a loop of thread to take up slack therein, and means to reverse the flow of air in the tube to eject the loop.

16. In a winder for winding a cheese, in combination, means to draw the thread of the cheese into position for operation thereon, and a pneumatic tube mounted to swing in a plane parallel to the axis of the cheese, said tube having a mouth arranged to swing close to the surface of the cheese and to draw in said thread to take up slack therein.

17. In a winder for winding a cheese, in combination, means to draw the thread of the cheese into position for operation thereon, and a pneumatic tube mounted to move in a plane parallel to the axis of the cheese, said tube having a plate extending transversely of the plane of movement and having a mouth in said plate arranged to move close to the surface of the cheese and to draw in said thread to take up slack therein.

18. In a winder for winding a cheese, in combination, means to draw the thread of the cheese into position for operation thereon, a pneumatic tube mounted to move in a plane parallel to the axis of the cheese, said tube having a mouth arranged to move close to the surface of the cheese and to draw in said thread to take up slack therein, and a guard member on the tube between the mouth and the cheese.

19. In a winder for winding a cheese, in combination, a knotter, means to draw the thread of the cheese into position for operation thereon by the knotter and means to disengage the thread from the knotter, said disengaging means comprising a pivoted arm arranged to swing against the thread.

20. The combination of a winder unit, a carriage arranged to travel past said unit, and mechanism on said carriage to unite the exhausted and a reserve thread, said mechanism comprising means to draw the exhausted thread downwardly, and a pneumatic tube movably mounted on said carriage and arranged to receive said thread from said means and draw said thread into said tube in the form of a loop and move it in the direction opposite to the direction of travel of the carriage, the body of said tube being sufficiently shallow in the direction perpendicular to the plane of the loop to hold said loop against rotation.

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