March 22, 1927. 1,622,254

G. RITTER

AUTOMATIC WINDING AND MEASURING MACHINE

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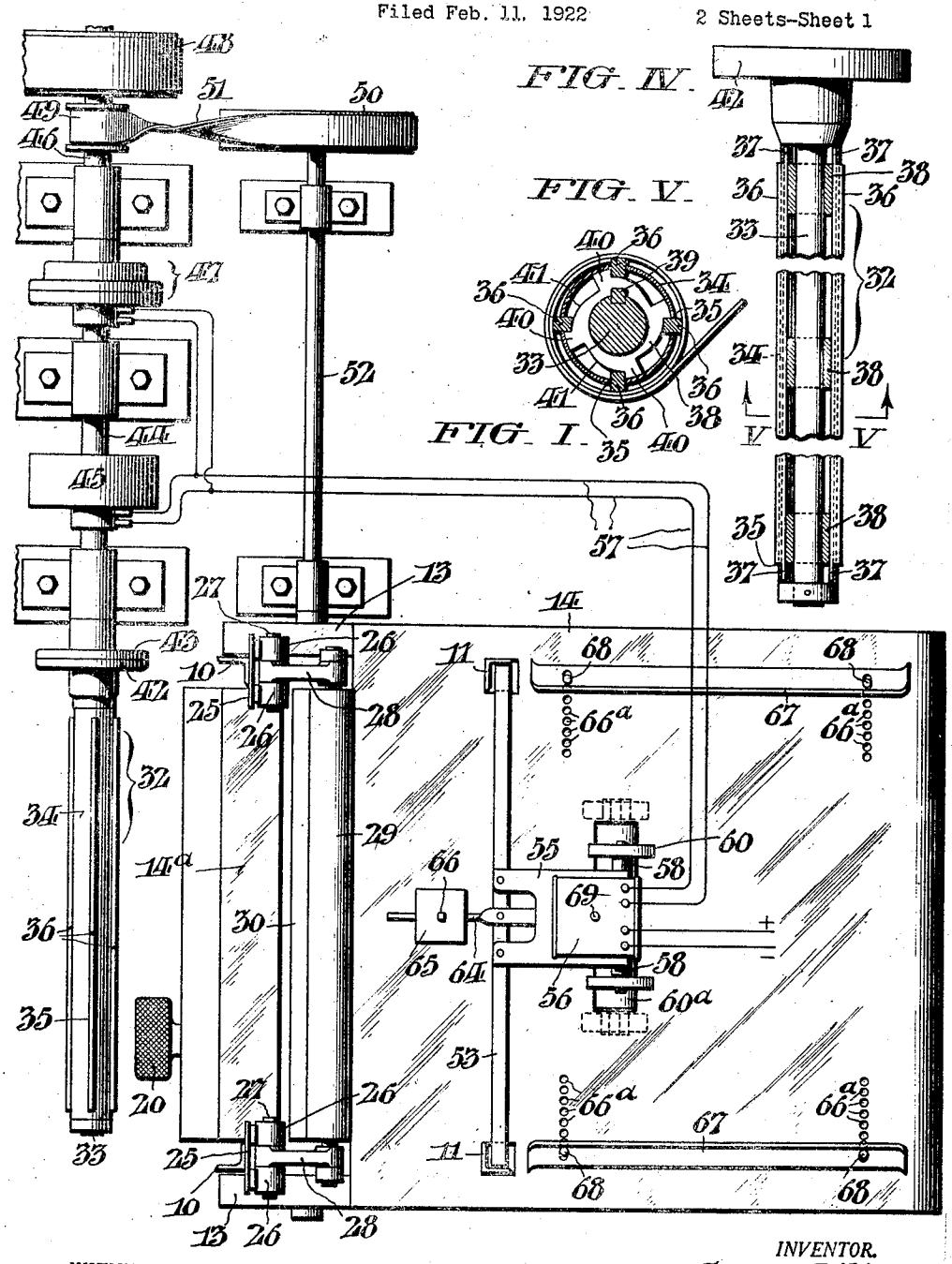


FIG. IV.

FIG. V.

FIG. I.

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FIG. II.

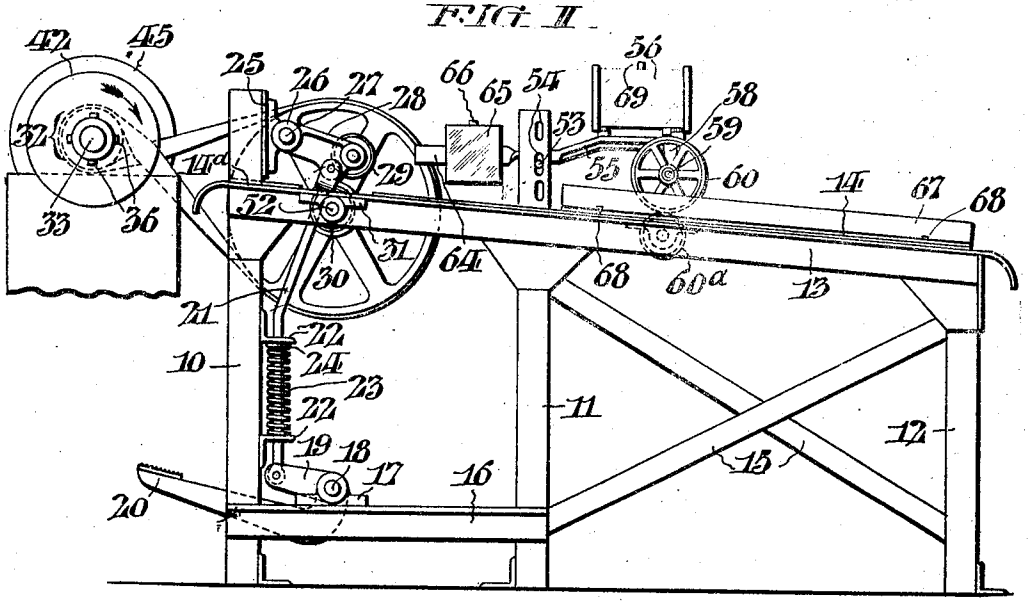
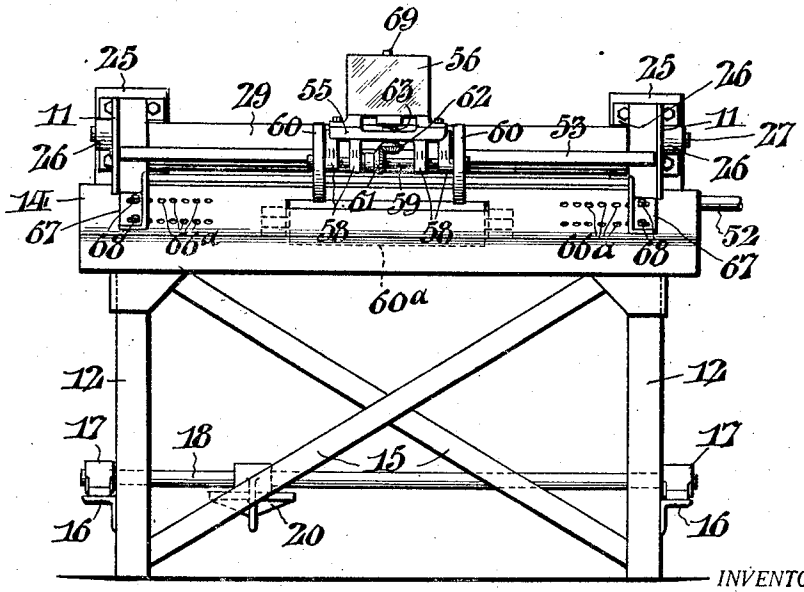


FIG. III.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC WINDING AND MEASURING MACHINE.

Application filed February 11, 1922. Serial No. 535,944.

This invention relates to winding machines and more particularly to machines for winding sheet roofing material spirally to form rolls containing a definite length of the material.

An object of the invention is to provide a machine of the typified class which embodies in addition to a winding mechanism for rolling the material upon a mandrel, an electrically operable mechanism adapted to be previously adjusted with reference to the length of material desired to be wound upon the mandrel, so as to automatically arrest operation of said winding mechanism when the exact predetermined length of the material has been rolled up.

Another object of the invention is to provide in a winding machine, a mechanism for facilitating the preliminary unwinding of the material by power from a source of supply so that the starting end of the material may be wound a few times around the mandrel to permit the latter to secure a grip upon the material, after which the automatic winding operation is continued through normal performance of the machine.

In addition to the foregoing, this invention comprehends improvements in the details of construction and arrangement of the correlated parts of what I now believe to be the preferred embodiment of my invention from among other possible forms and arrangements within the spirit of the invention and the scope of the appended claims.

In the accompanying drawings forming a part of this specification:

Fig. I is a view in top plan of a winding and measuring machine constructed in accordance with my invention.

Fig. II is a view of the machine in side elevation.

Fig. III is a view thereof in rear elevation.

Fig. IV is a detail view in broken longitudinal section of the winding mandrel; and

Fig. V is a transverse section on a larger scale taken on the line V—V of Fig. IV.

With reference to the drawings, 10, 11 and 12 indicate three pairs of supporting legs of structural iron, located in longitudinal spaced relation to support side rails 13, the latter in turn supporting a plate 14 forming the top of a table, which is inclined upwardly from the rear end, supported by the legs 12, to the front end supported by the legs 10; the legs 11 supporting the intermediate portion of said table. The upper ends of the legs 10 and 11 terminate above the plane of the table top as shown, by providing suitable recesses in the plate 14 to receive the legs 11 and by terminating the plate short of the legs 10. The legs 11 and 12 are connected by means of crossed braces 15, while the legs 10 and 11 are connected by means of a pair of horizontal braces 16, extending longitudinally of the machine. Each brace 16 supports a bearing 17 between which a transverse shaft 18 is journalled. A pair of arms 19 are rigidly secured to the shaft 18, one adjacent each end, and between said arms a foot pedal 20 is located and rigidly fixed to said shaft. A pair of links 21 are mounted in contiguous relation to the legs 10, each said link being pivotally connected at its lower end to its corresponding arm 19 and guided in brackets 22, a pair of which are mounted on each leg 10 in vertically spaced relation. A coiled spring 23 is embraced about each link 21 and interposed between the brackets 22, with the lower ends of said springs bearing against the lower brackets 22 and their upper ends thrusting against pins 24 inserted in transverse openings in the links 21. The upper end of each leg 10 carries a plate 25 upon its rear face and secured to each plate is a pair of spaced bearings 26 supporting a short section of shaft 27 between them in a horizontal plane. Loosely mounted on each section of shaft 27 is one end of a lever 28, of which a pair are provided, a horizontal roller 29 being journalled at its ends between said levers and upon the same, for movement in a vertical direction toward and away from the table top 14. The upper end of each link 21 is pivoted to its corresponding lever 28 at points intermediate the ends of the latter. It will be noted that the roller 29 is thus held in a normally elevated position by means of the springs 23. Located beneath the roller 29 is a second shaft supported roller 30, disposed parallel thereto and journalled at its ends between bearings 31 secured to the side rails 13, the surface of said roller projecting slightly above the plane of the table top 14. This roller 30 is located between the forward end of the table top 14 and a second section 14ª of the latter,

forming a continuation of said table top. Located in contiguous relation to the forward edge of the table top 14 is a mandrel designated generally at 32 and having the detailed construction shown in Figs. IV and V, which consists of a shaft 33 enclosed by means of a spaced sleeve 34, the latter being provided with a plurality of longitudinal openings 35 extending substantially from end to end and through which movable fins 36 protrude, the latter having end extensions 37 to prevent complete protrusion of said fins. Mounted on the shaft 33, within the sleeve 34 are a plurality of cams 38, each rigidly held by means of a spline 39. Each cam 38 is formed with a plurality of radial lugs 40, corresponding in number to the number of fins 36 employed, and the periphery of the cam, between each pair of lugs 40 is curved substantially in a spiral manner to form cam surfaces 41, which engage against the inner surfaces of the fins 36.

A coupling flange 42 is secured to one end of the shaft 33 for attachment to a complemental member 43 mounted on one end of a shaft section 44, suitably journalled. Rotation of the shaft section 33 and parts carried thereby is effected by the shaft section 44 under control of an electrically operable brake of conventional type, indicated generally at 45 the latter acting upon the shaft section 44 to permit or arrest motion thereof. A second shaft section 46 is journalled in alignment with the shaft section 44 and is adapted to be coupled to the section 44 and uncoupled therefrom by means of a conventional form of electrically operable coupling device or clutch 47. A pair of pulley wheels 48 and 49 are fixed upon the shaft section 46, one adapted to be belt driven from a source of power, and the other arranged to drive a pulley 50 by means of a crossed belt 51. The pulley 50 is mounted on a shaft 52 constituting an extension of the shaft which supports the roller 30.

Referring now to the measuring device, the upper ends of the legs 11 carry between them a transverse bar 53, preferably square in cross section but having rounded terminals which rest in the slots 54, of which a vertically spaced series is formed in each leg extension 11. A frame plate 55 is secured along one edge to the bar 53 and extending rearwardly supports a casing 56 containing a current controlling switch of conventional type having feeders 57 which lead to the brake and clutch elements, 45 and 47, respectively. A plurality of bearing brackets 58 depend from the plate 55 and support a transverse shaft 59, upon each end of which a wheel 60 is fixed, said wheels resting upon a short transverse roller 60ª suitably journalled for free rotation and projecting through an opening in the table top. A bevel gear 61 is fixed to the shaft 59 and meshes with a bevel gear 62 mounted on a shaft 63 which is intended to drive the mechanism of the switch contained within the casing 56. An arm 64, extending forwardly and fixed to the bar 53 and the plate 55, carries a counterweight 65 which may be secured in any adjusted position by means of a bolt 66 that enters the weight and engages the said arm. The table top 14 is provided adjacent each side edge with several series of transversely spaced openings 66ª and resting upon the table top are a plurality of angle bars 67, one adjacent each side edge. These angle bars constitute guides and are designed to be variously spaced and held in fixed relative positions by means of pins 68 which enter the bars and aligned openings 66ª therebeneath.

The machine just described is primarily designed for handling roofing material which consists of a base, such as paper, felt or similar substance, treated or impregnated with bituminous and other materials which render said base material waterproof, flexible and rather heavy. During the manufacture of this material the resultant product is usually wound spirally, forming a large roll. The material is subsequently unrolled and re-rolled into small rolls containing short lengths, convenient for shipping and handling. The use of the present invention contemplates the re-winding of this material into small rolls containing a measured length. To this end the guides 67 are spaced relatively to correspond to the width of the material, the starting end of which is laid upon the table top between said guides and then fed by hand between the measuring wheels 60 and the roller 60ª and finally located over the roller 30. It will be observed that the roller 30 is designed to rotate continuously under the influence of the continuously rotating shaft section 46. The foot pedal 20 is now depressed bringing down the roller 29 into engagement with the end of the material causing the material to be fed toward the mandrel 32. The material is then brought beneath the mandrel 32 and wrapped or rolled a few times around the same. This may be facilitated by rotating the sleeve 34 relative to the shaft 33 in a direction reverse to the normal winding direction of said shaft. The fins 36 will ride to the inner ends of the cam surfaces 41 bringing the outer surfaces of said fins flush with the surface of the sleeve 34. A switch button 69 mounted on the casing 56 or other convenient place is now actuated to close a circuit for the purpose of energizing the clutch 47 so as to lock together the shaft section 44 and 46, thus transmitting rotative movement to the mandrel 32 and causing the material to be wound thereon to form a roll. Under the rotative stress of the sleeve 34 the fins 36 will be moved outwardly

engaging the inner layer of the material and effecting a tight grip. The frictional engagement of the material passing beneath the measuring wheels 60 will cause rotation of the latter, which rotation is transmitted through the gears 61 and 62 to the shaft 63, operating the switch mechanism within the casing 56. The switch mechanism is of a nature to break the current to the clutch 47 after the wheels 60 have made a number of revolutions corresponding to a peripheral travel of a predetermined extent, thus disconnecting the shaft sections 44 and 46 and permitting the mandrel 32 to come to rest. The material is then severed transversely and the roll removed from the mandrel 32, containing a length of material equal to the amount of peripheral travel of the wheels 60 executed during operation of the machine, or between the periods of making and breaking of the circuit through the clutch 47. It is desirable that the energy of rotation of the mandrel 32 and roll be quickly absorbed so as to avoid winding up more material than intended. This is accomplished through the medium of the brake 45 which may be either of a type to arrest motion through magnetic stress induced when the mechanism is energized by the passage of an electric current, or of the type in which the braking power is supplied by springs or the like, held normally under tension and released by the making or breaking of a current.

Since these elements are well known a detailed description of their construction is not necessary, it being sufficient to point out what functions are expected of them as parts of the form of winding and measuring described above. The weight 65 may be shifted to partly balance the weight of the switch mechanism so as to relieve the material passing therebeneath of undue pressure.

In connection with the measuring device 56, it is to be noted, the same is purposely actuated by the material being wound in order to insure greater accuracy of measurement than is possible with ordinary measuring rolls. Furthermore, the measuring device 56 is so arranged that when a defective piece of material makes its appearance, and it is desired to exclude such defective portion from the predetermined length of good material, the operator simply rocks the device 56 from contact with the material by pressing downwardly on the free end of the arm 64, thereby elevating said device and preventing measurement of the defective material. Obviously, suitable means are provided for stopping the winding operation, so that the above mentioned defective material may be cut off and removed, whereupon winding is resumed, with the device 56 returned to normal operative position, without any inaccuracy occurring in measurement of the material, whether the roll comprises one sheet or a plurality of sheets.

From the foregoing it will be seen that I have devised a machine that is extremely simple in construction and well adapted to handle a material having the characteristics of bitumenized material. It will however be obvious that the construction shown may be used for winding and measuring many other kinds of material to equal advantage.

Having thus described my invention, I claim:

1. In an automatic winding and measuring machine for sheet material, the combination of an inclined table over which the material is progressed for measurement, a continuously operating driving means, a collapsible mandrel contiguous one edge of the inclined table, means for coupling the mandrel and driving means to wind the material to form a roll, means supported on the table and controllable by the passage of the material thereover to uncouple the winding mandrel and driving means after a desired length of material has been rolled, and braking means between the mandrel and driving means adapted to absorb the energy of rotation of said mandrel in bringing the same to a quick stop substantially simultaneous with the act of uncoupling from the driving means.

2. In an automatic winding and measuring machine for sheet material, the combination of an inclined table over which the material is progressed for measurement, a collapsible mandrel contiguous an edge of said table to wind the material to form a roll, a continuously operating driving means axially aligned with the mandrel, an electrically operable means adapted when energized to couple the winding mandrel to said driving means, and means supported on the inclined table and controllable by progress of material thereover to de-energize the electrically operable means aforesaid after a definite length of material has been rolled and incidentally arrest operation of the winding mandrel.

3. In an automatic winding and measuring machine for sheet material, the combination of an inclined table over which the material is moved for measurement, a collapsible mandrel contiguous the forward edge of said table to wind the material to form a roll, a continuously operating driving means axially aligned with the mandrel, an electrically operable means adapted to couple the winding mandrel to the driving means, switch mechanism supported on the table and controllable by passage of the material thereover effective to disconnect the electrically operable means and thereby release the driving means from the winding mandrel after a measured length of material has been rolled, and braking means in cir-

cuit with the switch functional to absorb the energy of rotation of the winding mandrel immediately subsequent to its disconnection from the driving means.

4. In a winding and measuring machine including a collapsible mandrel for winding material to form a roll, the combination of a pair of co-acting rolls normally inoperative and designed to feed the material to the mandrel, power actuated means connected with one of said rolls, rockable members freely journaled to the other roll whereby it may be moved relative to the first mentioned roll, and pedal actuated means co-ordinated with the rockable members effective to bring the last mentioned roll into contact with the material to advance the starting end thereof into proximity with the aforesaid mandrel for association therewith prior to initiating operation of the same.

5. An automatic winding and measuring machine for sheet material comprising an inclined table over which the material is moved for measurement, a power actuated driving means, a feed roll operated thereby, a collapsible mandrel contiguous the forward edge of the table to wind the material to form a roll, a freely journaled vertically movable roll, a spring influenced pedal co-ordinated with the movable roll, said rolls being adapted to bring the starting end of the material into association with the winding mandrel prior to fixing the end of said material thereto, means to couple the winding mandrel and driving means, and a measuring device supported on the table and controllable by the passage of material thereon functional to release the winding mandrel from the driving means whereby to arrest motion of said mandrel after a predetermined length of the material has been rolled.

6. An automatic winding and measuring machine for sheet material comprising a stationary inclined table upon which the material is progressed for measurement, a collapsible mandrel to wind the material to form a roll, a transverse member journaled above the inclined table and having measuring wheels adapted to rotate by frictional contact with the material passing over said table, and an electrically actuable switch mechanism supported by the table and operable by- and after- a predetermined number of revolutions of the measuring wheels have taken place to arrest rotation of the aforesaid mandrel.

7. In an automatic winding and measuring machine for sheet material, an inclined table over which the material is progressed having a recess therein, an idler roll rotatable in said recess and adapted to engage the underside of the material, measuring wheels frictionally engaging the material against the idler roll, a power actuated collapsible mandrel for winding the material, and switch mechanism—controlled by rotation of the measuring wheels—functional to arrest motion of the winding mandrel after passage of a predetermined length of material.

8. In an automatic winding and measuring machine for sheet material, the combination of an inclined table over which the material is moved, a pair of transversely spaced standards, a shaft journalled at its ends in said standards, a measuring mechanism supported by the shaft with capacity for vertical oscillation, measuring wheels associated in said mechanism and arranged to rest upon the table, and an adjustable counterweight beyond the shaft opposite to the measuring mechanism to counter-balance the latter.

9. In an automatic winding and measuring machine for sheet material, an inclined table, a pair of longitudinal angle-bar guides between which the material is progressed, pins for removably securing said guides in place subsequent to adjustment to the width of the material, and a measuring device pivotally supported by the transverse member above the machine table, said device engaging the material to measure the same during its passage over the table and having capacity for vertical oscillation when it is desired to avoid defective material.

10. In an automatic winding and measuring machine for strip material, a collapsible mandrel for winding the material to form a roll, a mounting therefor, a continuously moving roller over which the material is progressed, rock levers affording journal bearing for an idle roller positioned over the first mentioned roller, means supporting the rock levers and idle roller for vertical oscillation, springs normally urging the idle roller toward a position away from the moving roller, rocker arms coordinating the supporting means with a shaft journalled in the machine frame-work, and a foot pedal operative to bring the idle roller toward the moving roller to grip the material and feed the same toward the aforesaid mandrel.

11. In an automatic winding and measuring machine for sheet material, a support over which the material is fed, a collapsible mandrel in juxtaposition to the support and around which the material is wrapped to form a roll, a mounting for said mandrel, a shaft section journalled in alignment with the mandrel, a magnetic clutch intermediate the mandrel and shaft section, means engaging the material to measure the same during winding, and switch mechanism operable by the measuring mechanism for energizing the magnetic clutch and—after the passage of a predetermined length of material—to de-energize the same to arrest motion of the aforesaid mandrel.

12. In an automatic winding and measuring machine for sheet material, a support

over which the material is fed, a collapsible mandrel in juxtaposition to the support and around which the material is wrapped to form a roll, a mounting for said mandrel, a magnetic brake controlling rotation of the mandrel, a driving shaft journalled in alignment with the mandrel, a magnetic clutch intermediate the mandrel and the driving shaft, means for measuring the material during its passage over the support, and a switch operable by the measuring means to de-energize the magnetic clutch and brake simultaneously to quickly arrest motion of the winding mandrel and driving shaft.

In testimony whereof, I have hereunto signed my name at Maurer, New Jersey, this seventh day of February, 1922.

GEORGE RITTER.