A. C. BUNKER.

FABRIC CUTTING MACHINE.

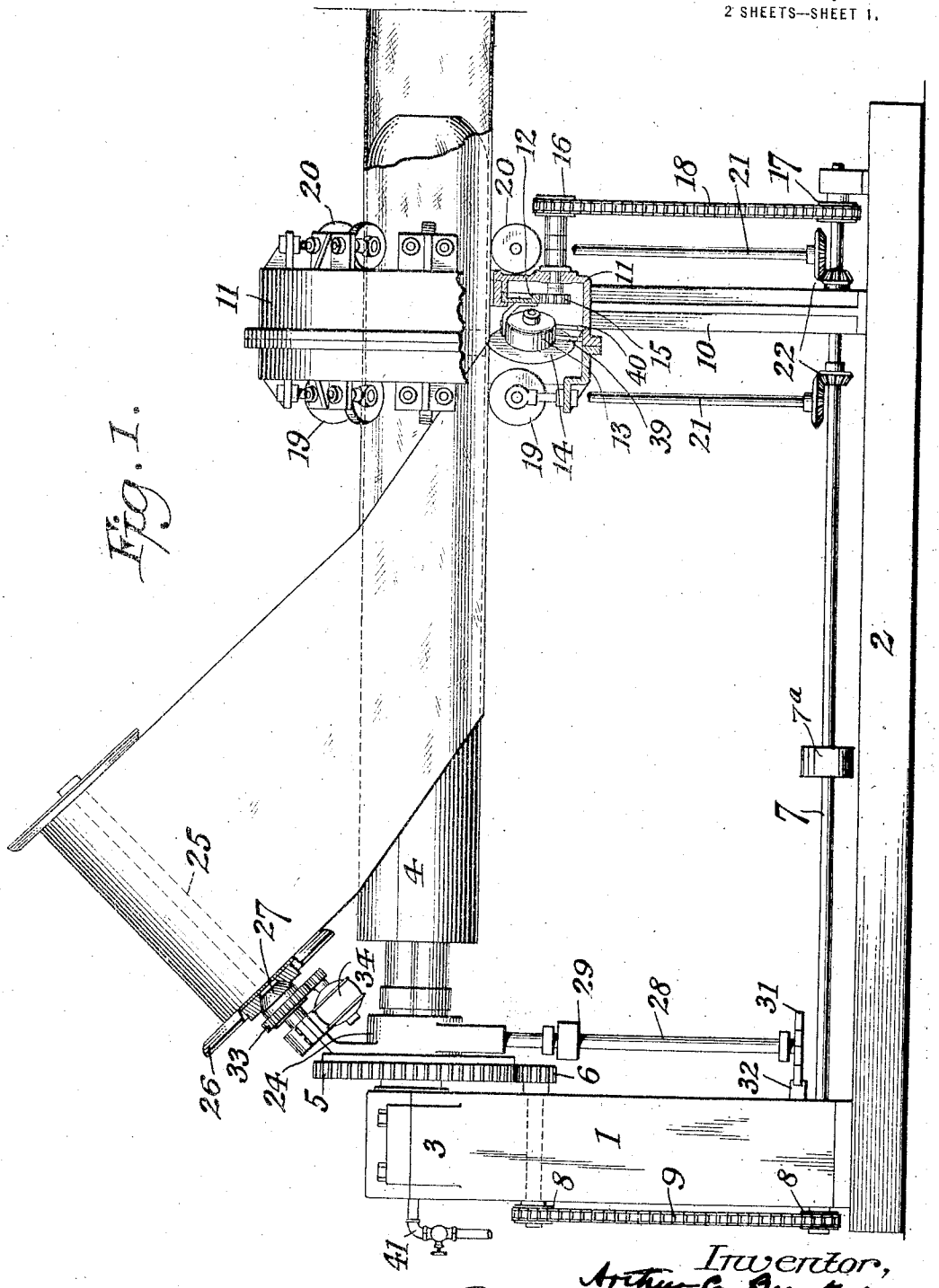
APPLICATION FILED FEB. 17, 1919. RENEWED JAN. 14, 1920.

1,356,485.

Patented Oct. 19, 1920.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

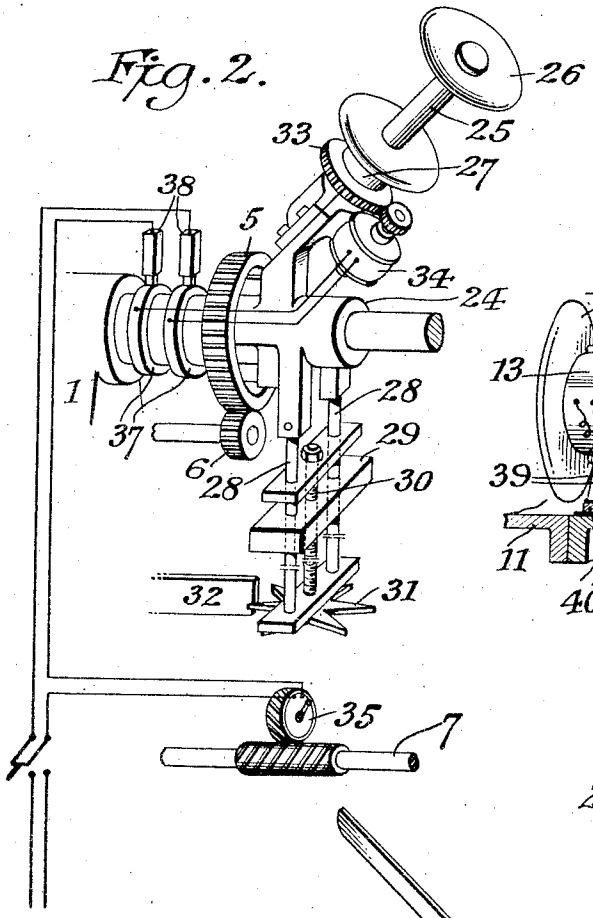
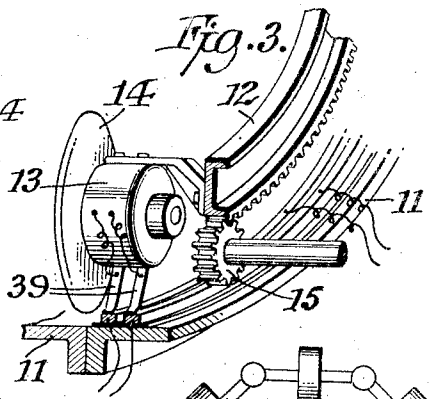


Fig. 3.



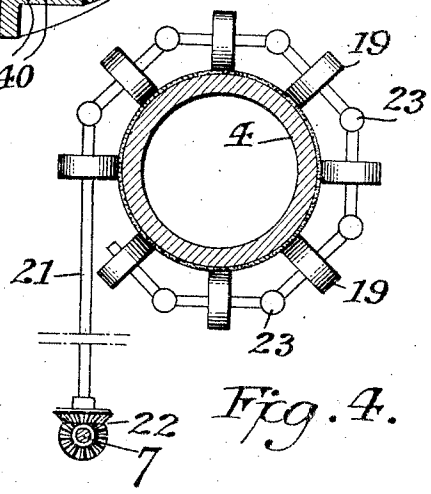


Fig. 4.

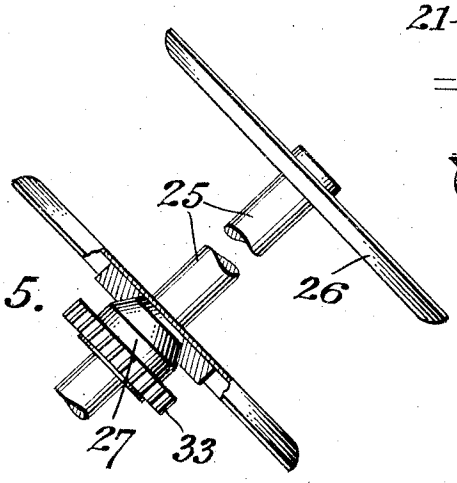


Fig. 5.

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UNITED STATES PATENT OFFICE.

ARTHUR C. BUNKER, OF MONTCLAIR, NEW JERSEY.

FABRIC-CUTTING MACHINE.

1,356,485. Specification of Letters Patent. Patented Oct. 19, 1920.

Application filed February 17, 1913, Serial No. 277,392. Renewed January 14, 1920. Serial No. 351,498.

To all whom it may concern:

Be it known that I, ARTHUR C. BUNKER, a citizen of the United States, residing at Montclair, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Fabric-Cutting Machines, of which the following is a full, clear, and exact description.

The invention upon which is based the present application for Letters Patent is an improvement in machines for cutting a strip or strips of fabric or other material on the bias from a tubular body of the same for such purposes as insulating conductors, or generally, winding around any object whenever it is desirable to use bias material.

The apparatus in which the invention is embodied is a new form or type of machine for feeding a tubular fabric and cutting therefrom a continuous strip and winding the latter on a spool or reel involving improved means for supporting and feeding the fabric while being cut, for regulating the tension on the winding reel which takes up the cut strip, for coördinating the strip-cutting and strip-winding mechanisms and in other respects for improving the operation and increasing the efficiency and practicability of the apparatus as a whole.

In illustration of the principle of the improvement I have shown in the drawings and I shall describe in the specification which follows, a machine with a single cutter designed to cut off from a tubular body of fabric a single strip on the bias, and such a construction is preferable from a practical standpoint, but, from the nature of the case, as will more fully hereinafter appear, the invention is not limited either in this regard, or in respect to the specific construction of the various elements involved except in so far as their function or purpose is concerned.

Referring to the accompanying drawings, which illustrate the preferred form of my improved machine;

Figure 1 is a view in elevation of the complete machine with parts omitted to show those remaining in section.

Fig. 2 is a detail view in perspective of the means employed for winding the severed strips and special means used in connection therewith.

Fig. 3 is an enlarged detail of the cutter mechanism.

Fig. 4 is a detail of a series of friction rolls; and,

Fig. 5 is an enlarged detail of the support for the winding spool or reel.

The machine consists essentially of a vertical support or pillow block 1, mounted on a suitable base 2, and providing a supporting socket 3 for a stationary horizontal drum of form 4, the outer end of which is free. Around the shaft or tube which carries the drum is revolubly mounted a spur gear 5 which is engaged by a pinion 6 driven by a main power shaft 7, by sprocket wheels 8 and a chain belt 9. The power shaft 7 is shown as provided with a pulley 7^a, by which it may be driven from any suitable source of power.

At the opposite end of the base is a standard or support 10 which carries an annular frame or cylinder 11 within which is supported an annular rotary gear 12 having a motor 13 driving a circular cutter blade 14 secured thereto. The gear 12 is engaged and rotated by a pinion 15 on a shaft mounted in the annular frame and driven by a sprocket 16 from a sprocket 17 on the main shaft 7 by a chain belt 18.

Mounted in the annular frame 11 are also two series of friction wheels 19 and 20, which are in planes radial to the axis of the drum 4 and adapted to turn upon or in close relation to its periphery. Each series of friction wheels, as shown in Fig. 4, is driven by a vertical spindle 21 connected to the drive shaft 7 by bevel gears 22 and the several wheels of each series are connected through their spindles by universal joints 23, so that all rotate in unison under the driving force of the main shaft. The wheels 19 are of slightly greater diameter than the wheels 20 for a purpose to be hereinafter explained.

Rigid with the spur gear 5 or mounted on a sleeve 24 secured to or integral therewith is a spindle 25 for a winding reel 26. The preferred construction of this part of the apparatus is shown in detail in Figs. 2 and 5 to consist of a conical bearing 27 on the spindle to afford a seat for the winding reel by which it is automatically adjusted to its proper position, and a counterbalance for the weight of the reel which is adjustable as to its counterbalancing effect in proportion to the load which may be imposed upon the reel.

This counterbalance consists of a frame composed of parallel bars 28 upon which slides a weight 29 engaged by a threaded rod 30 passing through it and supported in the upper and lower sides of the frame. A star wheel 31 secured to the threaded rod 30 encounters a stop or finger 32 in each revolution which the reel and its supporting parts make and the rod is thus turned to shift the weight nearer to its extreme position or toward the star wheel as the weight of the reel increases with the load of fabric which is wound upon it in the operation of the machine.

The reel has connected to it a spur gear 33, which is engaged and driven by an electric motor 34 to wind up the strip of fabric. In order that the rate of winding may be substantially constant the speed of the motor is regulated by a rheostat or other suitable means controlled by a gear wheel 35 engaging with a worm on the main shaft 7. The motor connections 36 lead to rings 37 on the sleeve 24, and upon such rings bear brushes 38 which convey the current.

The means for varying or controlling the speed of the motor may be of any well-known character. For instance, it is well known that by varying the resistance of the motor circuit, and hence the flow of direct current thereto, its speed is varied, and hence in the present case, for purposes of illustration, we show merely a rheostat which, being turned by the main shaft, varies the resistance of the main circuit. Various other means for accomplishing the same result are very well known in the art.

These parts are so designed and adjusted that when the reel is first started in rotation to wind up the strip of fabric the speed of the motor is at its maximum, but as it takes up the fabric and the diameter of the roll increases the speed of the motor, by the rotation of the main shaft, will be reduced.

It will be understood that a definite time will be required to fill the reel 26 with the strip of fabric wound thereon, and since the speed of the motor should slow down only during the interval of winding, it is manifest that the pitch of the threads which impart rotation to the rheostat, as well as the character of the latter, should be such that resistance will be included in the motor circuit for such entire interval. Assuming that the duration of this interval is three minutes, for sake of illustration, the parts should be so adjusted and related that the main drive shaft by its normal rate of rotation will operate the rheostat to throw in resistance at least for such period.

In the operation of this machine power is applied to the main shaft which imparts rotation to the gears 5 and 12, and the gears are so related that these motions are synchronous, whereby the reel will draw off the fabric from the drum at the exact rate that it is cut. The fabric or other material to be cut has its edges sewed together, or is woven or made in tubular form, and is passed over the free end of the drum. It is drawn over the drum, as a strip is cut from it, by the friction rolls 19 and 20, and as the former are slightly larger than the latter the fabric under the cutter is drawn taut as the wheels advance the fabric.

Any suitable form of cutter may be used, but the most convenient is a rotary disk cutter operating over a groove in the drum, and its driving motor should be properly counterbalanced to eliminate the slack take-ups in its travel.

When the machine is started in operation the cutter blade rotated by its motor 13 and carried around the drum by the pinion 15 and gear 12 cuts off at an angle of forty-five degrees to the direction of movement of the fabric on the drum a bias strip which, being attached to the winding reel, is wound up thereon at exactly the rate it is cut from the fabric. The motor 13 receives its current through brushes 39 which travel over circular conducting strips 40 secured inside the annular frame 11.

The above constitute the essential features of my improved machine. In practice, however, other details may be used which assist in its operation. For example, the drum 4 may be mounted on a hollow shaft to which, through a valve-controlled pipe 41, air or gas under pressure may be admitted to keep the tube material extended or to facilitate the passage of the fabric over the drum. Such other appurtenances as are shown in the drawings require no detailed description as they are matters within the ordinary knowledge of those skilled in this art.

What I claim is:—

1. In a strip-cutting machine the combination with a drum for receiving a tubular fabric and supported at one end of a winding reel revoluble around the axis of the drum, a rotary cutter supported in bearings revoluble around the drum, said cutter being set at an angle to the axis of the drum, a driving shaft, gearing between the same and the supports for the winding reel and for the rotary cutter, and means for rotating the reel about its axis.

2. In a machine for cutting strips on the bias from a tubular fabric, a drum over which the fabric is drawn while being cut, said drum being held at one end only in a fixed support, in combination with means for cutting a spiral strip from the fabric and synchronized means for winding up said strip as it is cut.

3. In a machine for cutting strips on the bias from a tubular fabric, the combination with a drum over which the fabric is drawn while being cut, a cutter revoluble around

the drum, friction rolls acting to draw the fabric over the drum at rates which maintain it taut as it passes the cutter, and means for winding up the strip as it is cut.

4. In a machine of the kind described, the combination with a drum over which a tubular fabric may be passed, a cutter revoluble around the drum to cut a spiral strip from the fabric, a winding reel for taking up such strip as it is cut, a variable speed motor for rotating said reel, and means controlled by the driving mechanism of the machine for controlling the speed of the motor whereby the strip will be wound on the reel at a constant rate.

5. In a machine of the kind described, the combination with a drum over which a tubular fabric may be drawn, a cutter revoluble around the drum to cut a spiral strip from the fabric, a winding reel revoluble around the axis of the drum for taking up the strip as cut, and a counterbalance weight for said reel movable from the axis of the drum, and means for moving the weight in proportion to the amount of strip which is wound on the reel.

6. In a machine of the kind described, the combination with a drum over which a tubular fabric may be drawn, a cutter revoluble around the drum, two series of friction wheels for advancing the fabric and located on opposite sides of the cutter, and gears from the driving shaft of the machine to the two series of friction wheels.

7. In a machine of the kind described, the combination with a drum supported at one end with the other end free, means for drawing a tubular fabric over the drum, a revoluble cutter to which the fabric is fed and from which it is delivered after being cut, and a winding drum revoluble about the axis of the drum for taking up the strip as it is cut.

8. In a machine of the kind described, the combination with a drum supported at one end and free at the other, means for advancing a tubular fabric longitudinally over the drum, and a cutter revoluble about the drum, and means for feeding the fabric and rotating the cutter so as to produce a line of cut at a predetermined degree of inclination to the axis of the drum.

In testimony whereof I hereunto affix my signature.

ARTHUR C. BUNKER.