July 16, 1935. S. SHEPHARD 2,008,473

YARN PACKAGING MACHINE

Filed April 20, 1934 5 Sheets-Sheet 1

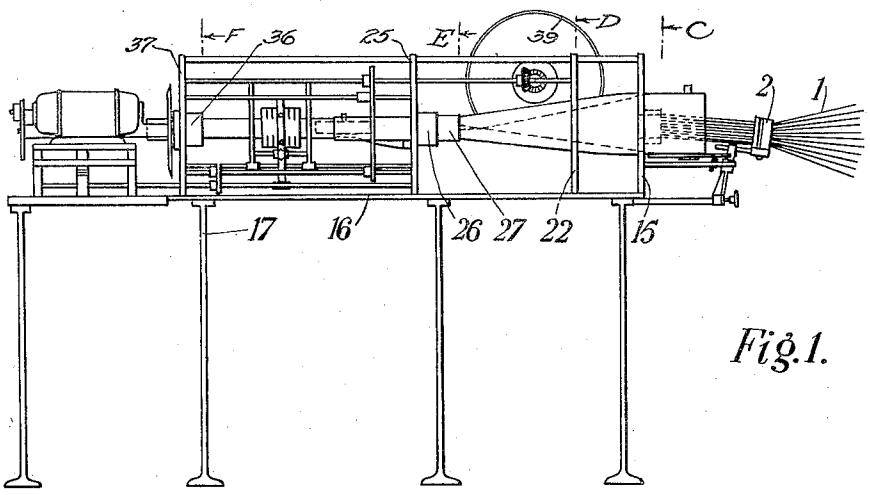


Fig. 1.

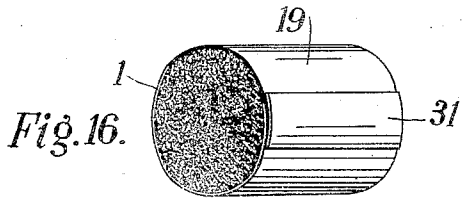


Fig. 16.

Fig. 2.

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YARN PACKAGING MACHINE

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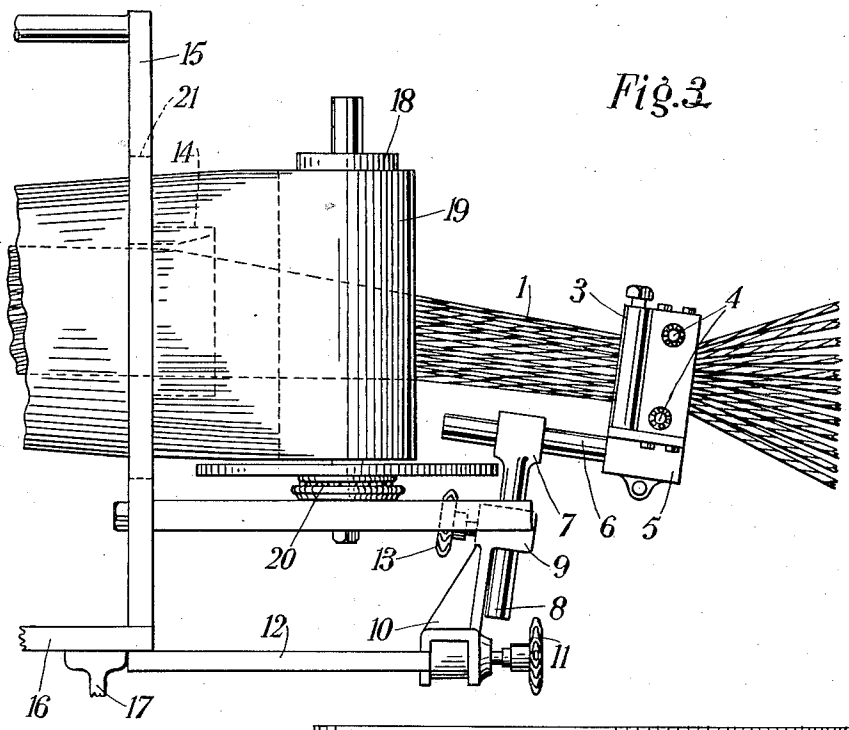


Fig. 3.

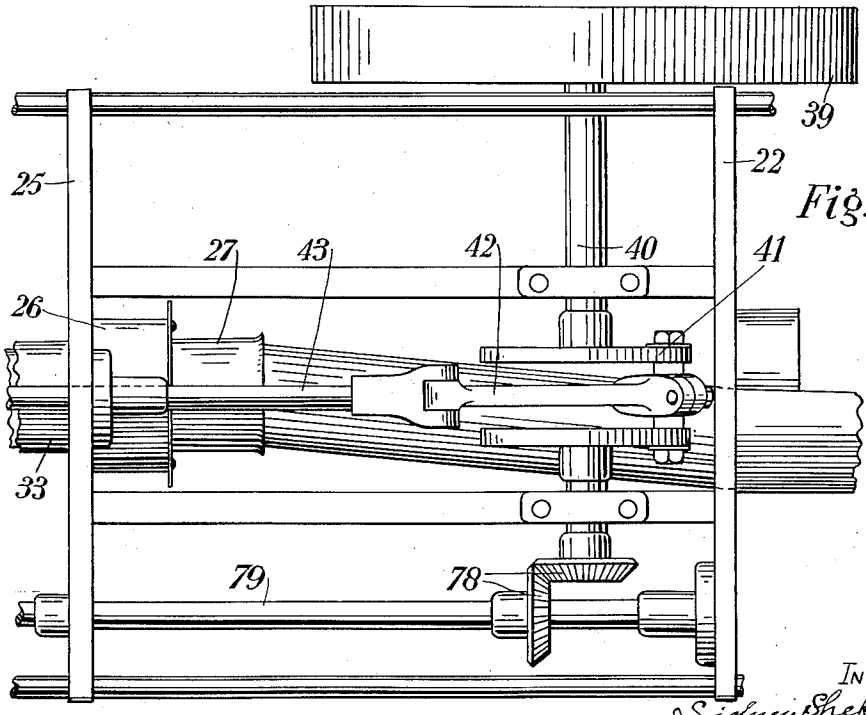


Fig. 4.

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YARN PACKAGING MACHINE

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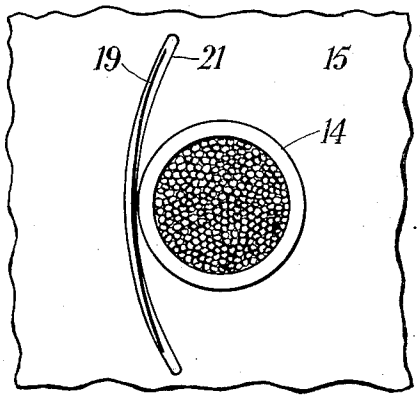


Fig. 9.

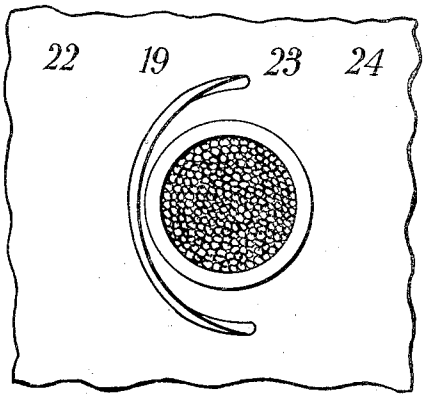


Fig. 10.

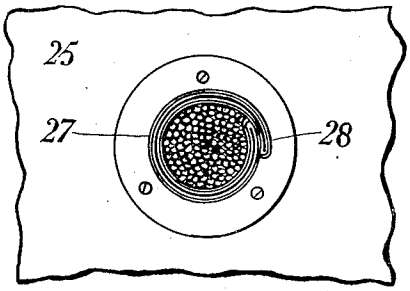


Fig. 11.

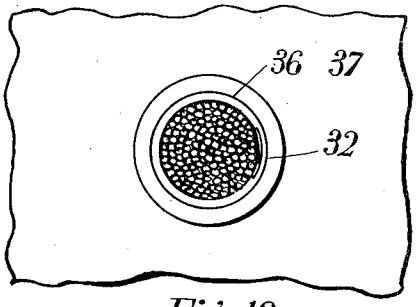


Fig. 12.

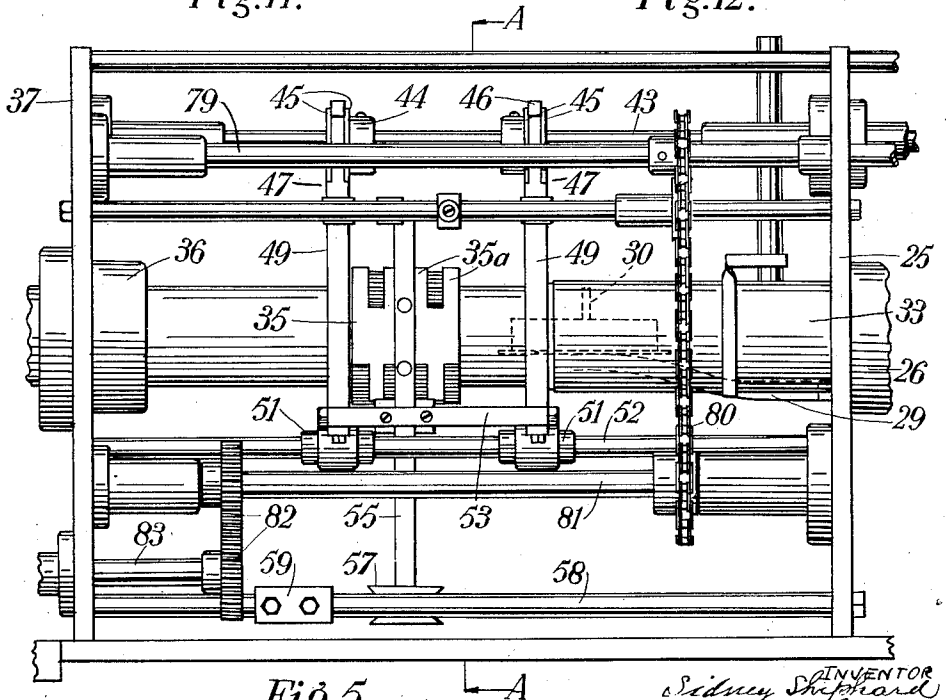


Fig. 5

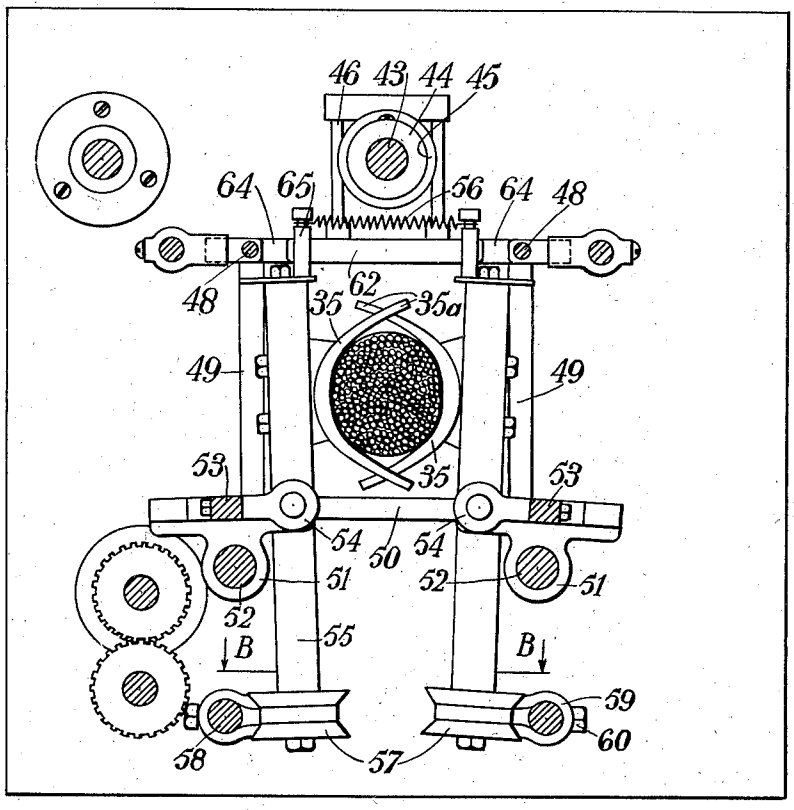
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YARN PACKAGING MACHINE

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Fig. 6.



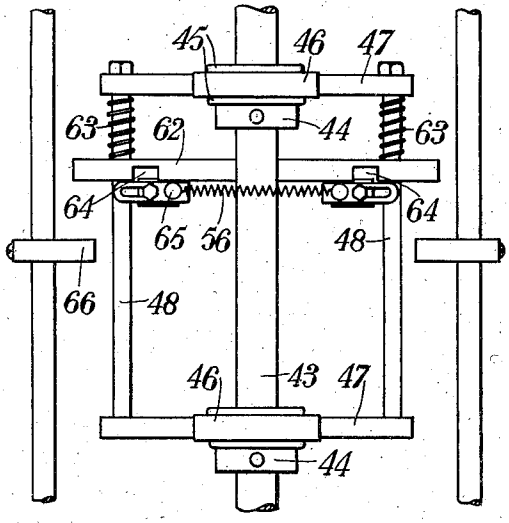


Fig. 7.

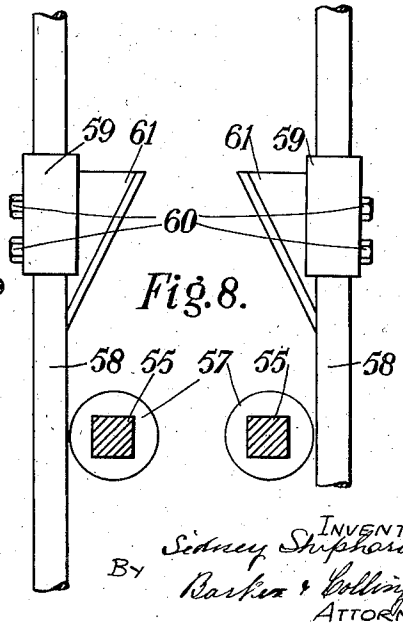


Fig. 8.

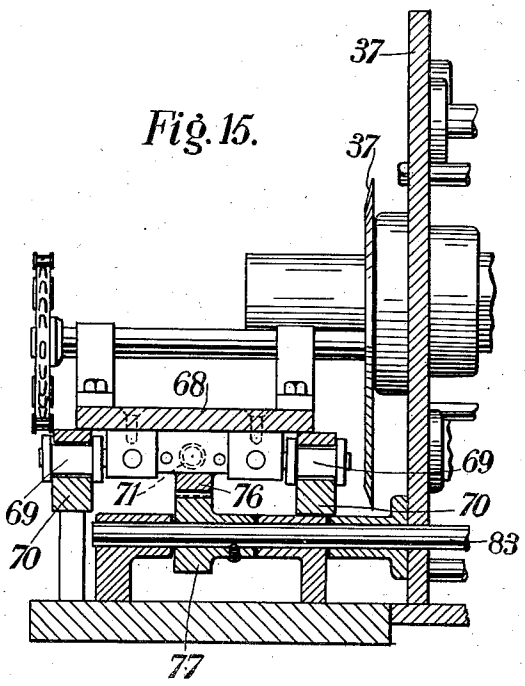
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YARN PACKAGING MACHINE

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Fig. 15.



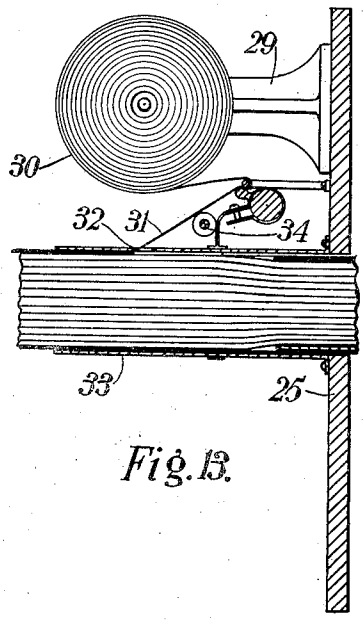
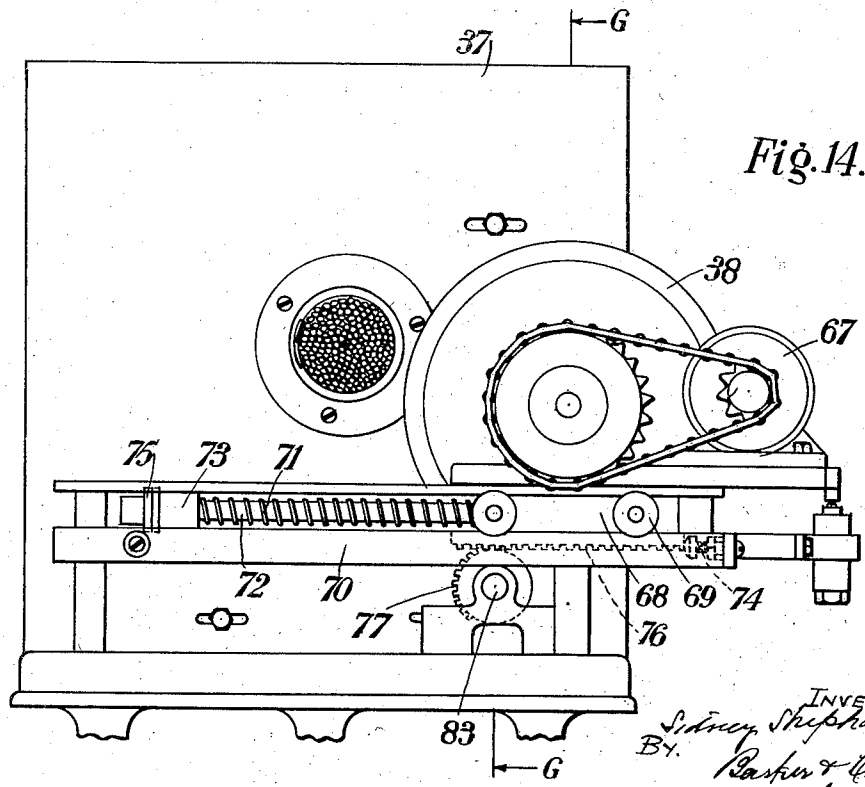


Fig. 13.

Fig. 14.



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Patented July 16, 1935 2,008,473

UNITED STATES PATENT OFFICE

2,008,473

YARN PACKAGING MACHINE

Sidney Shephard, East Bridgford, near Bingham, England

Application April 20, 1934, Serial No. 721,579
In Great Britain March 12, 1934

11 Claims. (Cl. 28—21)

This invention relates to a machine for producing packages, and although same is mainly concerned with packages for wool and other yarns, it is here to be understood that the invention may have a considerably wider application.

In so far, however, as packages for wool or equivalent yarns are concerned, the invention refers chiefly to wool such as is employed in pegging or otherwise making rugs and the like by hand. In this connection, it has hitherto been customary to supply wool or equivalent yarns for rug making in skeins or hanks which subsequently require to be cut into the required short lengths with scissors or shears. This, of course, is a long and tedious process and it is practically impossible by such process to cut the yarn into exactly equal lengths; and consequent upon the use of unequal lengths of yarn the pile of the finished rug is rendered uneven. Additionally, the operation of clipping wool necessarily nips together the fibrous strands at the cut ends and thus impairs the soft downy appearance of the pile.

An object of the present invention is to eliminate the necessity of cutting rug wool or like yarns by hand by providing means functioning automatically to cut and neatly pack the wool or the like. Another object is to ensure that all of the lengths or portions of cut wool or the like in an individual package are of exactly equal length; while a further object is to provide a novel and handy package containing wool cut into predetermined lengths, which package permits of individual lengths or pieces being easily withdrawn for use as required without unduly disturbing the remaining yarn in the package.

With these and other objects in view a feature of the present invention consists in a machine such as is hereinafter described and particularly as set forth in the accompanying claims whereby packages of wool or other yarns or material are produced; while another feature resides in the improved package produced which is also hereinafter described and claimed.

For the purpose of more fully describing the nature of this invention reference will now be made to the accompanying drawings, wherein:—

Figure 1 is a general elevational view of a machine in accordance with this invention.

Figure 2 is a rear end elevation of the machine.

Figure 3 is a side elevation of the rear end portion of the machine.

Figure 4 is a plan of a part of the machine showing the drive.

Figure 5 is a side elevation of the central part of the machine.

Figure 6 is a vertical section on A—A of Figure 5, but drawn somewhat larger.

Figure 7 is a plan of the upper part of Figure 6.

Figure 8 is a sectional plan on B—B of Figure 6.

Figures 9, 10, 11 and 12 are detail views showing four successive steps in gathering and wrapping the yarns, these steps occurring respectively at the positions C, D, E and F of Figure 1.

Figure 13 shows in sectional plan an adhesive strip feeding device.

Figure 14 is a front elevational view of the machine showing the cutter.

Figure 15 is a vertical section on G—G of Figure 14.

Figure 16 shows a yarn package produced by the machine.

In the machine illustrated in the drawings, which by way of example relates to the packing and cutting of wool or other yarns, the several yarns 1 to be embodied in the packages are supplied from a rack or creel of bobbins or equivalent supplies (not shown) and led therefrom through a rectangular gate 2 at one end of the machine (which for convenience of description will be referred to as the rear end) formed by a pair of parallel vertical guide rollers 3 and a pair of parallel horizontal guide rollers 4, (see Figure 2), said rollers 3, 4 being mounted in anti-friction bearings. These rollers are advantageously carried by a bracket 5 adjustably fixed to an extending rod 6 (Fig. 3) which may in turn be adjustably fixed in a boss 7 which may support said bracket 5 at an incline; the boss 7 being itself formed with a depending pin 8 accommodated in a substantially vertical boss portion 9 of another bracket 10 detachably and adjustably fixed centrally of the width of the machine by one or more screws 11 to a horizontal portion 12 of the machine frame. The depending pin 8 is preferably adjustable up and down in the boss 9 so as to raise and lower the bracket 5 carrying the aforesaid yarn guide rollers 3, 4, a screw 13 being provided for fixing the rollers at the required height.

The series of yarns 1 which are gathered together and passed through the aforesaid gate are led forwardly from said gate preferably at a small incline up through a short centrally-disposed tubular guide 14 having a flared mouth and carried by a vertical cross plate 15 constituting a part of the machine frame, which machine frame is conveniently provided with a base plate 16 raised from the floor upon a plurality of sup-

ports 17 or a supporting frame, (Fig. 1). Rotatably mounted on a vertical axis at the rear of the aforesaid vertical plate 15 is a roller 18 on which is wound an elongated sheet or strip of paper 19 to be used for wrapping the yarns 1; the width or height of said paper strip 19 being somewhat greater than the total circumferential dimension of the yarn package to be formed. The paper supply roller 18 is preferably mounted on a ball or other anti-friction race 20. The paper strip 19 is fed through a slightly curved or arcuate slot 21 located closely alongside the circular yarn guide 14 in the aforesaid vertical plate 15; and a suitable distance in front of this vertical plate is a second similar plate 22 which is also provided with an arcuate slot 23 for the passage of the paper strip 19, partly encircling a central circular yarn guide opening 24, said second slot 23 being, however, of a smaller radius than the first slot 21. These two arcuate paper guide slots cause the paper strip 19 to be gradually and increasingly curved partly around the grouped series of yarns 1 carried along the machine; and at a further distance forwardly in the machine is a third upstanding plate 25 also having a central circular opening from which projects rearwardly a hollow boss 26 which may be of somewhat smaller diameter than the circular thread guide boss 14 in the first plate and forms a further guide for the bunched yarns. At the rear of this hollow boss 26 is fixed a short tube 27 which is a double-wall tube (Fig. 11), the inner and outer walls of said tube being radially spaced to permit of the passage therebetween of the curved paper strip 19. This double-wall tube 27 is provided with an overlap at 28 so as to cause the paper guided therethrough to overlap at its longitudinal edges. The inner wall of the double tube preferably extends axially forward through the central boss 26 and vertical plate 25 carrying same so as to provide a substantially long tubular guide for the paper strip 19, which strip as it emerges from the front end of said guide closely encircles in tubular formation the bunched yarns.

The tubular paper wrapping is now fixed in position closely embracing the bunched yarns by applying to the overlapping edges of said wrapping a strip of adhesive paper or its equivalent. One method of accomplishing this is by mounting on the front side of the vertical plate 25 a bracket 29 rotatably carrying a vertically disposed roller or spindle 30 (Fig. 13) from which the adhesive strip 31 is withdrawn and passed over one or more suitable guides through a slot 32 at the side of a central cylindrical guide 33 through which the wrapped yarns are traversed and which extends forward from the plate 25; a dampening roller 34 or other means being provided for moistening the strip prior to its entry into said tubular guide 33. In this way a continuous length of fixing strip is applied to the tubular paper wrapping for the yarns.

The yarns so wrapped are intermittently traversed through the machine by jaws or gripping elements 35 (Figs. 5 and 6) to which is imparted an opening and closing movement and also a reciprocating backward and forward movement; the arrangement being such that said jaws when opened move rearwardly relatively to the wrapped yarns, then close upon the wrapped yarns to grip same and move forwardly to traverse said wrapped yarns through the machine; a further centrally disposed tubular guide 36 being provided in another vertical plate 37 at the front of the machine for the passage of the wrapped yarns.

At the front end of the machine is provided a cutting device comprising a motor or otherwise driven circular cutting blade 38, said cutting device being traversed to and fro transversely of the machine so as intermittently to sever the wrapped yarns into predetermined lengths; each length severed forming the required package.

The machine is driven from any convenient source of power transmitted by a belt to a pulley 39 mounted on a drive shaft 40 (Fig. 4) carried in bearings at the top of the machine frame and extending transversely across said frame. From this drive shaft reciprocating motion is imparted to the aforesaid gripping jaws 35 longitudinally of the machine and to the cutter 38 transversely of the machine. To operate the gripping jaws 35 a double crank 41 is provided on the drive shaft 40 which reciprocates through a connecting rod 42 a longitudinal guided slide bar 43. This bar has adjustably fixed thereto by grub screws or the like two bosses 44 (Figs. 5, 6 and 7) each having a pair of spaced flanges 45 accommodating between same a small rectangular frame member 46 projecting up from a cross bar 47, which bar constitutes the foremost portion of a horizontally disposed rectangular frame composed of said cross bars 47 and longitudinal rods 48, said frame being connected by four vertical bars 49 to a similar lower horizontal rectangular frame 50 provided with depending sleeves or tubular brackets 51 for sliding movement upon a pair of fixed horizontal guide bars 52. On the longitudinal members 53 of this lower sliding frame 50 are provided inwardly projecting bracket members 54 to which are pivotally connected a pair of transversely spaced upstanding arms 55 (Figs. 5 and 6), the pivots being located approximately midway in the height of said arms. On the inner side of the two centrally pivoted arms 55 is mounted a pair of opposed gripping jaws 35 of concave formation upon their inner or gripping faces, said jaws being advantageously lined with rubber or the like. Each jaw is advantageously formed with a plurality of spaced finger portions 35a at its upper and lower part so arranged that the finger portions of the one jaw are adapted to pass freely between and intersect the fingers of the opposed jaw. The upper ends of the two pivoted jaw-carrying arms 55 are normally pulled towards each other by spring means 56, while at the lower end of each jaw-carrying arm is mounted a grooved roller 57 adapted to run between a pair of fixed horizontal rods 58. Each of said guide rods 58 has adjustably fixed thereto by sleeve 59 and screws 60 an inwardly projecting cam member 61, the opposed faces of the two cams converging towards the forward end of the machine. The cam rods 58 may also be mounted in transverse slots in the plates 25, 37 for adjustment towards and away from each other.

The reciprocating motion imparted to the aforesaid slide bar 43 transmits similar reciprocating motion to the gripping jaws 35 through the aforesaid sliding frames carrying said jaws. On the longitudinal members 48 of the upper of said rectangular sliding frames appertaining to the jaws and at the forward end of said frame is slidably mounted a cross bar 62 (Figs. 6 and 7) displaceable in a forward direction against springs 63, the rear face of said slidable cross bar 62 having a pair of transversely spaced notches 64 for the purpose hereinafter described.

On the initial part of the forward stroke of the

reciprocating jaws 35, the rollers 57 on the pivoted jaw-carrying arms 55 run clear of the converging cams 61 and the jaws are, therefore, pulled towards each other by the aforesaid spring 56 so as to grip the wrapped yarns and carry same forward through the machine. At the termination of said forward stroke the rollers 57 coact with the converging cams 61 to pivot the jaw arms 55 and open the jaws so as to release same from the wrapped yarns preparatory to the return stroke. During this return stroke a pair of upstanding pins 65 at the upper end of the pivoted jaw-carrying arms 55 enter the notches 64 in the aforesaid spring-influenced sliding cross bar 62 and by this means the jaws are maintained open after the rollers 57 have moved out of contact with the cams 61. When the jaws 35 have been moved rearwardly to the required extent an extension of the notched cross bar 62 coacts with an adjustable stop 66 which presses the cross bar forwardly against its springs 63 and releases the pins 65 on the jaw-carrying arms 55 from the notches 64, said pins when released being drawn together by a spring 56 so as to close the jaws 35 upon the wrapped yarn. The length of stroke imparted to the reciprocating jaws can be adjusted by adjusting the throw of the crank 51 by pin and slot adjustment or in any other known manner, thereby variably determining the length of wrapped yarns traversed at each stroke and consequently also determining the axial length of each package severed.

The rotatable cutter disc 38, driving motor 67 and chain or other drive therefrom are advantageously mounted upon a cradle 68 having flanged rollers 69 which run between parallel guide rails 70 (Figs. 14 and 15) transversely of the machine, the traverse of the cradle in one direction, i. e. on the cutting motion, being positively imparted against the influence of a spring or springs 71 functioning to effect a quick return travel of the cradle. Advantageously a compression spring 71 is employed for this purpose coiled around a rod 72 moving with and projecting from the cutter cradle 68 centrally in the width thereof, said rod being slidably guided within a fixed sleeve 73. An adjustable stop or stops 74 is or are provided for determining the return motion of the cutter cradle, while a rubber or equivalent buffer member 75 may be provided near the end of the aforesaid spring-encircled rod 72 to act as a buffer for this return motion.

On the underside of the cutter cradle and travelling therewith is a short rack 76, which may be adjustably fixed, and with said rack is adapted to mesh an interrupted gear 77, i. e. a rotary gear wheel having teeth on part of its circumference only. During the operation of the machine continuous rotation is imparted to this interrupted gear 77 which in its engagement with the rack 76 moves the cutter cradle and cutter disc across the machine to an extent sufficient to sever a length of wrapped yarns; the continued rotation of the interrupted gear 77 causing same to move out of engagement with the rack 76 and permit the cutting device to be returned under the influence of spring 71. The drive may be transmitted to the interrupted gear 77 by any suitable means from the drive shaft 40. For example the rotation of the drive shaft may be imparted through intermeshing bevels 78 (Fig. 4) to a longitudinally extending rotatably mounted shaft 79, thence by sprockets and chain 80 (Fig. 5) to a further longitudinal rotatable shaft 81 at the lower part of the machine, and from this last shaft through intermeshing gears 82 to a short stub shaft 83 to which the interrupted gear 77 is keyed.

It will be appreciated that material other than paper may be employed for wrapping the bunched yarns to produce the packages, as also for fixing said wrapping in position around the yarns. For example the wrapping may be of suitable extensible material and may be applied under a certain degree of tension so as to contract upon the bunched yarns.

Also, the drive of the cutter may be transmitted from the drive shaft 40 instead of from a separate motor.

By the employment of a machine as above a novel and handy package of cut wool or similar yarn can be produced, which package comprises a large number of comparatively short lengths of wool or the like bunched together parallel one with another in solid cylindrical form and closely embraced by a sheath of paper or equivalent flexible material composed of a sheet or strip overlapping at its two edges and fixed at said overlapping edges by an adhesive strip portion covering said edges. The several yarn portions are all of equal length and the axial length of the tubular sheath is also equal to the length of the yarns as also is the length of the fixing strip portion so that said yarns are completely enclosed and protected except at their cut ends. From a package so formed the several yarn portions can readily be withdrawn individually without disturbing the remaining yarns; and where said yarns are of wool it will be appreciated that they can be compressed during packing into a tight compact mass so that as individual portions are withdrawn, the remaining portions expand to fill out the package.

I claim:—

1. A machine for producing packages of material embodying means for gathering the material together in a closely massed bunch, a supply of flexible wrapping material, said wrapper being fed as a continuous length or strip, a plurality of guides functioning to produce a transverse curvature of progressively decreasing radius to said wrapper so as to transform same from a straight strip into a tube, means for passing said tubular wrapper closely around the bunched material so that the longitudinal edges of the wrapper overlap, means for securing said overlapping edges, means operating intermittently to grip the wrapped material and traverse same through the machine, a cutter device and means whereby said cutter operates intermittently to sever the bunched and wrapped material at the termination of each traversing movement thereof.

2. A machine according to claim 1 and including spaced guides through which the material to be wrapped is traversed and by which said material is gathered together and maintained as a closely massed bunch, and means whereby the wrapping material is fed and traversed simultaneously alongside said bunched material and progressively transformed in its traverse into a tube closely encircling said bunched material.

3. A machine according to claim 1 and wherein a continuous length of wrapping material is traversed from a supply through spaced guide slots of progressively increasing curvature so as to transform said material from a straight strip into a tube.

4. A machine for producing packages of material embodying means for gathering the material together in a closely massed bunch, a sup-

ply of flexible wrapping material, said wrapper being fed as a continuous length or strip, a plurality of guides functioning to produce a transverse curvature of progressively decreasing radius to said wrapper so as to transform same from a straight strip into a tube, means for passing said tubular wrapper closely around the bunched material so that the longitudinal edges of the wrapper overlap, means for securing said overlapping edges, opposed gripping jaws displaceably located on opposite sides of the wrapped bunch of material, means for opening and closing said jaws, means for reciprocating said jaws, means whereby on one stroke of the reciprocating motion the jaws grip and traverse the wrapped material to a predetermined extent in an axial or longitudinal direction, said jaws on their opposite or return stroke being opened to move clear of the wrapped material, a cutter, and means operating said cutter automatically to sever a length of the wrapped material at the termination of each traversing motion imparted to the material by said jaws.

5. A machine according to claim 4 and including means whereby the cutter device is traversed to and fro transversely of the machine at the delivery end thereof, the cutting stroke being timed to sever the wrapped material on the completion of each feeding stroke of the gripping jaws.

6. A machine according to claim 4 and including a rotary cutter, means for imparting rotation to said cutter, a travelling cradle or carrier for said cutter, means for traversing said cradle with cutter to and fro across the machine at the delivery end thereof, means for determining the length of travelling motion imparted to the cradle and cutter, and means for imparting a quick return or non-cutting stroke to said cradle and cutter.

7. A machine according to claim 4 wherein the cutter is traversed to and fro across the machine and wherein the cutting stroke is effected by a rotary interrupted gear meshing with a rack moving with said cutter, and a rapid return or non-cutting stroke is effected by spring means.

8. A machine according to claim 4 wherein the gripping jaws are carried by laterally pivotal arms which are reciprocated longitudinally of the machine, said arms being pivotally displaced by opposed cam members against spring resistance to open the jaws and being displaced by said spring to close said jaws; the opening of the jaws being effected at the termination of the longitudinal traverse of said jaws in one direction, and the closing being effected at the termination of the longitudinal traverse in the opposite direction.

9. A machine for producing substantially cylindrical packages of strands, comprising means for gathering the strands in parallel disposition into a rope-like form, a feed for a flexible sheet-material binder, means for eneveloping the rope in said binder, means for securing the binder in enveloping position, and a cutter for repeatedly cutting completely through the enveloping binder and the rope of strands encircle thereby to sever cylindrical packages having cut ends and which are completely surrounded right up to their cut ends by the flexible sheet-material binder.

10. A machine for producing substantially cylindrical packages of strands, comprising means for assembling the strands into a rope in which they extend longitudinally, means for withdrawing a strip of flexible wrapping material from a supply thereof, means for applying said wrapping material longitudinally of the rope to enclose it in an enclosure wrapping having a substantially longitudinal join, means for securing said join, and means for cutting through the wrapping and contained rope to sever cylindrical packages having cut ends which packages are wrapped up to said ends.

11. A machine for producing cylindrical packages of strands having cut ends and being enclosed for substantially their entire length in a flexible sheath of sheet material, comprising means for gathering strands in parallel disposition into a closely wrapped bunch, means for supplying a strip of flexible sheet-material, means for applying said strip longitudinally of the bunch and for curving it to enclose said bunch as in a tube, means for fastening the edges of the strip, and means for cutting through the tube and enclosed bunch to sever the aforesaid packages.

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