2 Sheets--Sheet 1.

L. C. BILLINGS.

Machine for Balling Yarn.

No. 165,978. Patented July 27, 1875.

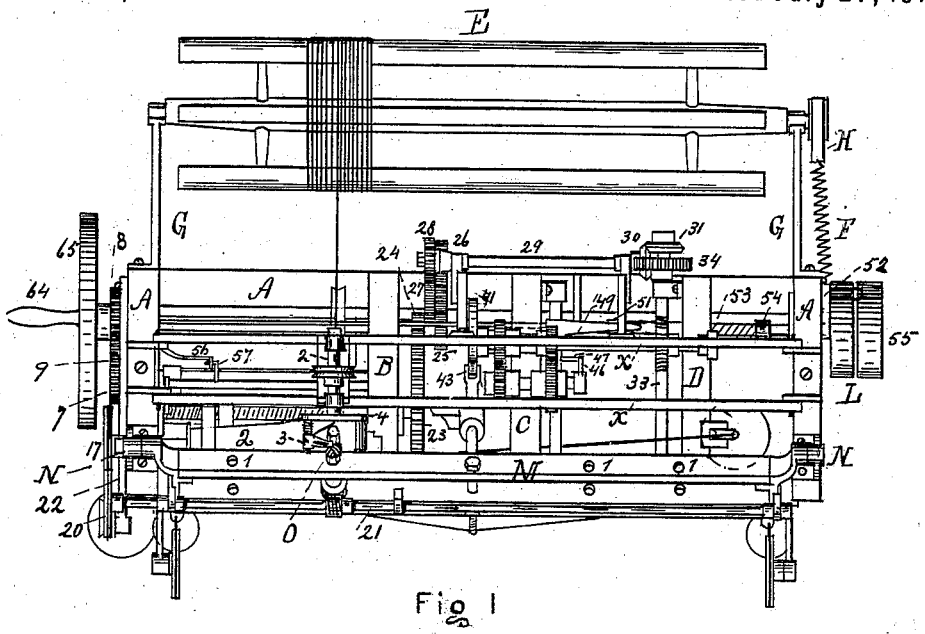

Fig. 1

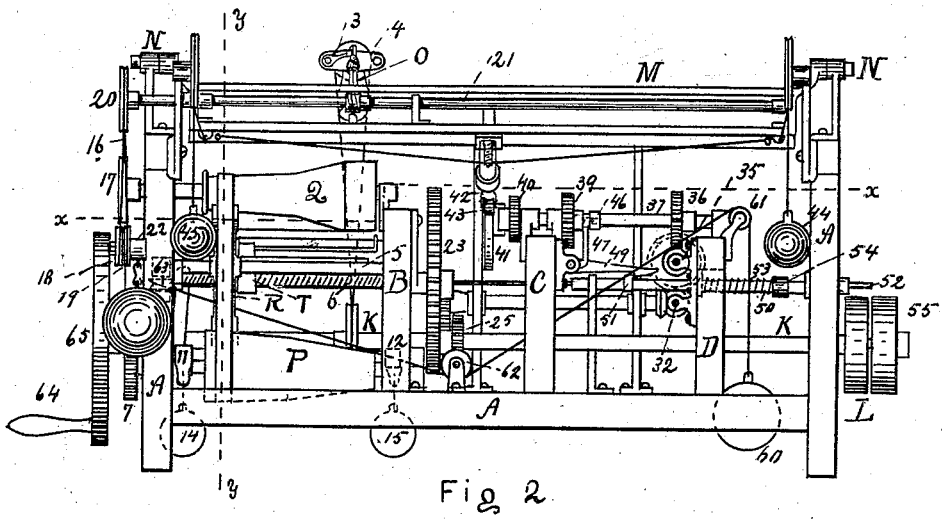

Fig. 2

WITNESSES

T. D. Livermore

Francis H. Lincoln

INVENTOR

Louis C. Billings

2 Sheets--Sheet 2.

L. C. BILLINGS.

Machine for Balling Yarn.

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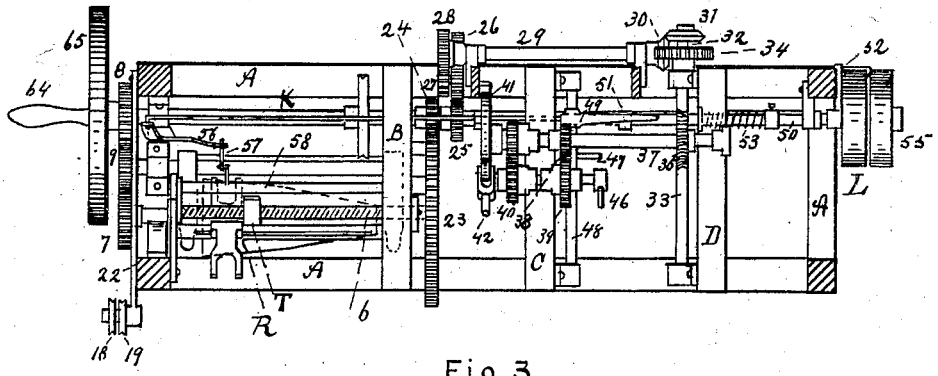

Fig. 3.

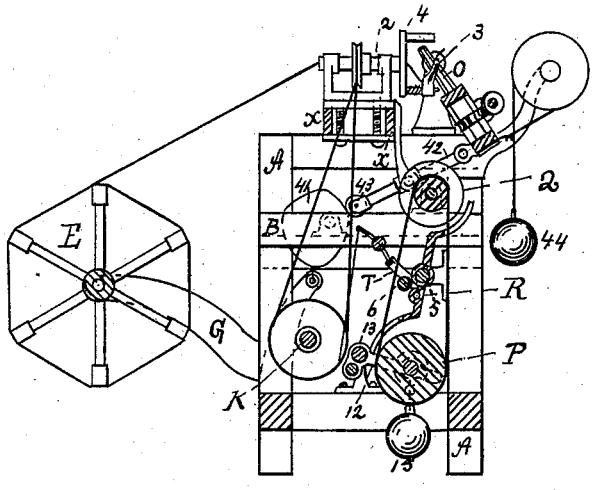

Fig. 4.

WITNESSES

T. L. Livermore

Francis H. Lincoln

INVENTOR

Louis C. Billings

UNITED STATES PATENT OFFICE.

LOUIS C. BILLINGS, OF MILFORD, NEW HAMPSHIRE.

IMPROVEMENT IN MACHINES FOR BALLING YARN.

Specification forming part of Letters Patent No. **165,978**, dated July 27, 1875; application filed May 27, 1875.

To all whom it may concern:

Be it known that I, LOUIS C. BILLINGS, of Milford, in the State of New Hampshire, have invented an Improvement in Machines for Balling Yarn, of which the following is a specification:

The objects of my invention are, first, to produce balls of yarn which shall have a loose and elastic interior and a compact exterior; and, second, to regulate and determine, with great exactness, by mechanism in balling-machines, the quantity of yarn and similar articles wound into each ball.

My improvements to accomplish these objects are shown in the accompanying drawings of a balling-machine containing them, of which—

Figure 1 is a top view; Fig. 2, a front view. Fig. 3 is a top view of a horizontal section on the line *x x*, and Fig. 4 is a view of a vertical section on the line *y y*.

A is the frame of the machine, and B C D are three gallows-frames fixed on the lengthwise stringers of the frame A. A reel, E, carries the material to be balled, revolves, and is kept by a spring, F, in bearings on the ends of arms G G, which extend out from the frame A. The reel may be taken out of the bearings by removing from the pulley on the end of its journal the hook H, to which the spring F is attached. The other end of this spring is attached to the frame A. The main shaft K revolves in bearings fixed to the inside of the rear posts of the frame A and gallows-frame B, and is so revolved by a belt on a fast pulley, L, at its outer end. M is a swinging frame, so hung upon pivots turning in bearings N N, which project up from the ends of the frame A, that its lower side is free to swing toward and away from the machine. A spindle, O, to wind the yarn or other material on, revolves in bearings (such as shown at 1 1 1) in the longitudinal pieces of the frame M. The yarn or other material is carried from the reel E through a hollow shaft, 2, which revolves in bearings projecting up from two parallel bars, X X, extending along the top of the frame A from one end to the other of it. The yarn or other material, having passed through the hollow shaft 2, is carried to and through a curved horn, 3, and thence to the spindle O, upon which it is caught. The horn 3 turns slightly on a prong of the flier 4, which is fixed to, and revolves with, the hollow shaft 2. This horn so turns to permit it to accommodate itself to the increasing size of the ball as it is being wound, and is kept in its position relative to the periphery of the ball by a helical spring on the same horn of the flier, one end of which is fastened to the horn. Revolution of the flier 4 insures the winding of the yarn or other material around the spindle O diagonally. Revolution of the spindle O insures the winding of the yarn in regular layers around it.

Hitherto the speed of the spindle O, in machines of this kind, has been evenly decreased as the winding has progressed, so that the yarn has been laid at equal intervals in all the layers. The first part of my invention consists in mechanism for so winding yarn in balls that the layers near the exterior are wound closely to a sufficient depth to make a compact and close finish, and all the layers inside of those are wound with the layers having considerable intervals between them, so that the yarn, excepting in the layers constituting the finish, is elastic and not unduly stretched. I accomplish this by transmitting motion to the spindle O through two cone-pulleys, P Q, the longitudinal outline of each of which is the reverse of that of the other. A belt from the pulley P drives the pulley Q, and is moved evenly along both pulleys from left to right by two forks at the ends of an arm, R, each of which embraces the belt. This arm R slides on a shaft, 5, which bears a spline that fits a groove in the orifice through the arm, to keep the latter from turning. A clutch or half-nut, T, is pivoted to the side of the arm R, and has upon its under side a thread, which fits a screw-shaft, 6, the revolution of which moves the clutch T, and by it the arm R, from left to right. The pulley Q has a slight taper for the larger part of its length, then a greater taper, and finally is considerably increased in diameter, and then tapers slightly to the right-hand end, whereby it will be seen the speed communicated from this pulley to the spindle O will be greater at first than at the finish, and will be comparatively very slow as the exterior layers are wound on the ball, which will insure the laying of the threads close together in these exterior layers, and at wider intervals in the rest of the layers.

The shafts 5 and 6, and the shafts of the pulley P, rest in bearings on the frame A

and gallows-frame B. The shaft of the pulley P is revolved by the gear-wheel 7, which is revolved by gear-wheel 8, fixed on the main shaft K, through an intermediate loose gear-wheel, 9, on the shaft 13. The shaft of the pulley P revolves in bearings in the ends of two arms, 11 and 12, which swing on the shaft 13, and are kept down by the weights 14 and 15, suspended to them. The shaft 13 rests in bearings projecting up from the lower cross-pieces of the frame A.

Revolution is imparted to the spindle O from the cone-pulley Q by means of a belt, 16, running from the pulley 17 on the shaft of the cone-pulley Q over two intermediate pulleys, 18 and 19, and the pulley 20, which is fixed on and revolves the shaft 21, and a worm on the shaft 21, engaging a gear on the spindle O. The shaft 21 revolves in bearings on the frame M; and, to accommodate the belt 16 to the swinging of this frame, the pulleys 18 and 19 rise and fall by reason of their running on a journal on the end of an arm, 22, whose other end is pivoted to the frame A.

A series of spindles, O, may revolve on the frame M, as at 1 1 1, all actuated by the shaft 21, and receiving yarn from a series of winding mechanisms, all actuated from the main shaft K, and supported on the bars X X, as described above.

The gear-wheel 23, which is fixed on the screw-shaft 6, is driven by a gear-wheel, 24, fixed on the main shaft K. A gear-wheel, 25, on the main shaft K, through two intermediate gear-wheels, 26 and 27, and the gear-wheel 28, fixed on the shaft 29, drives the shaft 29. A beveled gear, 30, fixed on the shaft 29, drives a beveled gear, 31, fixed on the shaft 32. A gear on the shaft 32 drives the shaft 33 by a gear, 34, fixed on its end, and a worm, 35, on the shaft 33 drives the gear-wheel 36, which is fixed on the shaft 37. The journal which bears the gear-wheels 26 and 27, and the shaft 29, revolve in bearings fixed on curved standards attached to the frame A. The shafts 32 and 33 revolve in bearings on the gallows-frame D, and the shaft 37 revolves in bearings on the gallows-frames C and D. A gear, 38, on the shaft 37 drives a gear, 39, on a short parallel shaft revolving in bearings on the gallows-frame C. This short shaft, by a gear, 40, drives a cam, 41, through a loose gear on the shaft 37. A bar, 42, hinged at its upper end to the lower bar of the swinging frame M, and reciprocating through a bearing attached to the bar X, has a roller, 43, in its lower end, which rolls against the cam 41. The revolution of the cam 41 causes the swinging frame, aided by the weights 44 and 45, to swing up and down in such a manner as to present the spindle O to the winding apparatus, so that the yarn will be wound to leave a nearly perpendicular rabbet around each end of the orifice in which the spindle is, which affords a convenient place on which to affix a label.

The pin 46, by the revolution of the short shaft last mentioned, is made to strike the under side of a curved latch, 47, and throw it back, thereby giving a partial revolution to the shaft 48, to which the latch is fixed. This shaft 48 has a dog, 49, fixed to it, which engages with a fast collar, 51, on the shipping-rod 50. The shaft 48 rotates in bearings on the gallows-frame C, and the shipping-rod reciprocates longitudinally in bearings on the frame A and gallows-frame D. One end of the shipping-rod 50 bears a shipper, 52, through which the belt that drives the pulley L runs.

The parts of the winding apparatus and the shipping apparatus are so proportioned that the latch 47 is thrown back by the pin 46 at the moment when the required quantity of yarn or other material is wound on the spindle O. This gives the shaft 48 a partial rotation, and disengages the dog 49 from the fast collar 51, whereupon a helical spring, 53, on the shipping-rod 50, which has been compressed between the bearing of the shipping-rod on the gallows-frame D and a fast sleeve, 54, on the shipping-rod, is released, and, throwing the shipping-rod to the right by the shipper 52, carries the belt which revolves the pulley L of the main shaft over on the loose pulley 55, and thus stops the machine. The same movement of the shipping-rod 50 pulls over a bent lever, 56, attached to its other end, which, by a connecting-rod, 57, turns a shaft, 58, which throws up a rod, 59, connected with the shaft 58, and which, by reason of being engaged in the forked end of the clutch T, carries this clutch upward, so that its thread is disengaged from the screw of the shaft 6. Thereupon a weight, 60, by means of a cord passing over a pulley, 61, on the gallows-frame D, under a pulley, 62, on the frame A, and around a pulley, 63, on a bracket of the frame A, and attached to the forked arm R, pulls the arm R from right to left along the shaft 5, and thereby carrying the belt which revolves the pulley 2 to its smallest end. Thus the machine is prepared to begin winding a new set of balls.

The handle 64 on the large balance-wheel 65 at the left of the machine is not used in practice.

I claim—

1. The belted cone-pulleys P and Q, of different tapers, as described, in combination with the spindles O, whereby the intervals between the threads are varied in the different layers, substantially as and for the purpose specified.

2. The combination of the shipping and winding mechanism, constructed as described, whereby, when the proper amount of twine or yarn is wound upon the ball, the shipping-lever is tripped, and the machine automatically stopped, as set forth.

LOUIS C. BILLINGS.

Witnesses:

T. L. LIVERMORE,

FRANCIS H. LINCOLN.