

B. K. FORD.
TUBE MACHINE.
APPLICATION FILED JAN. 22, 1912.

1,059,045.

Patented Apr. 15, 1913.

4 SHEETS—SHEET 1.

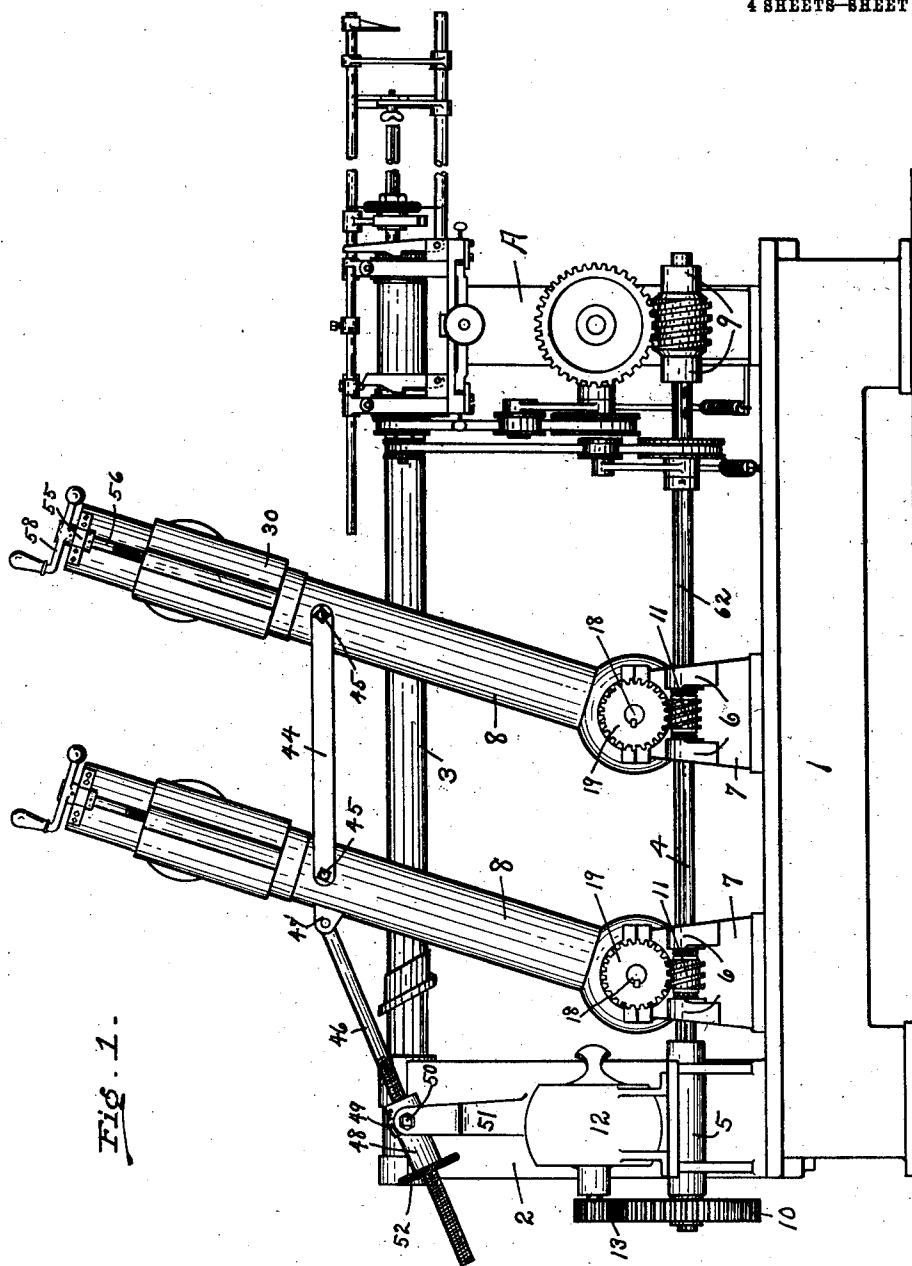


Fig. 1.

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4 SHEETS—SHEET 2.

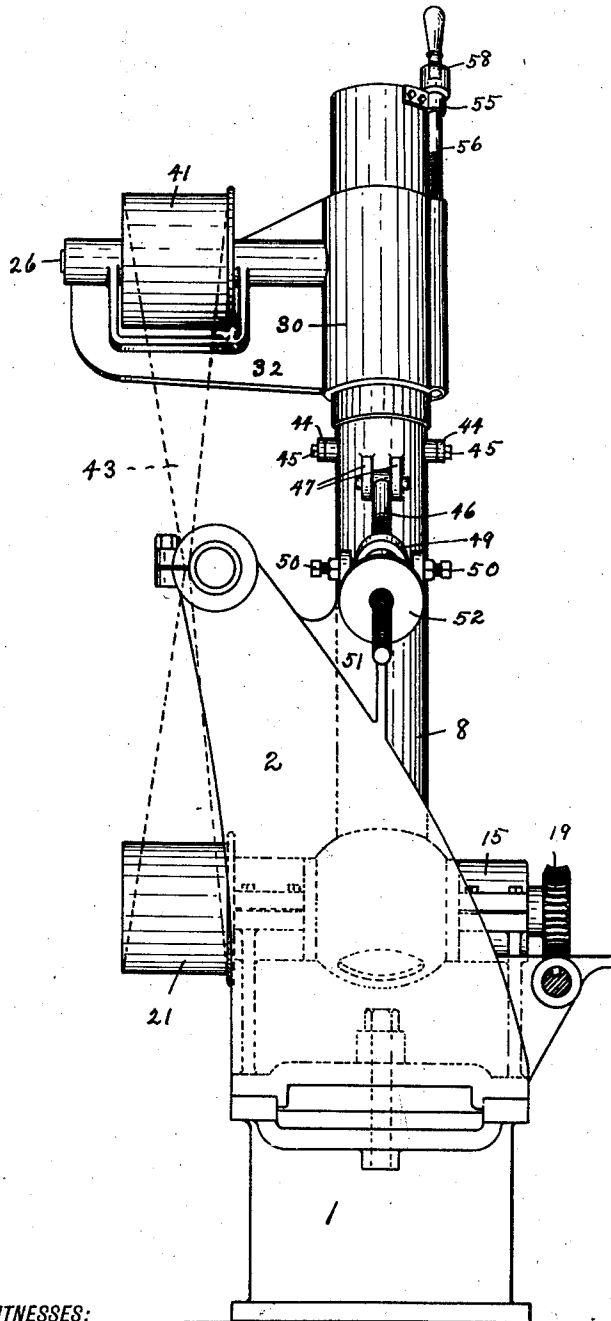


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

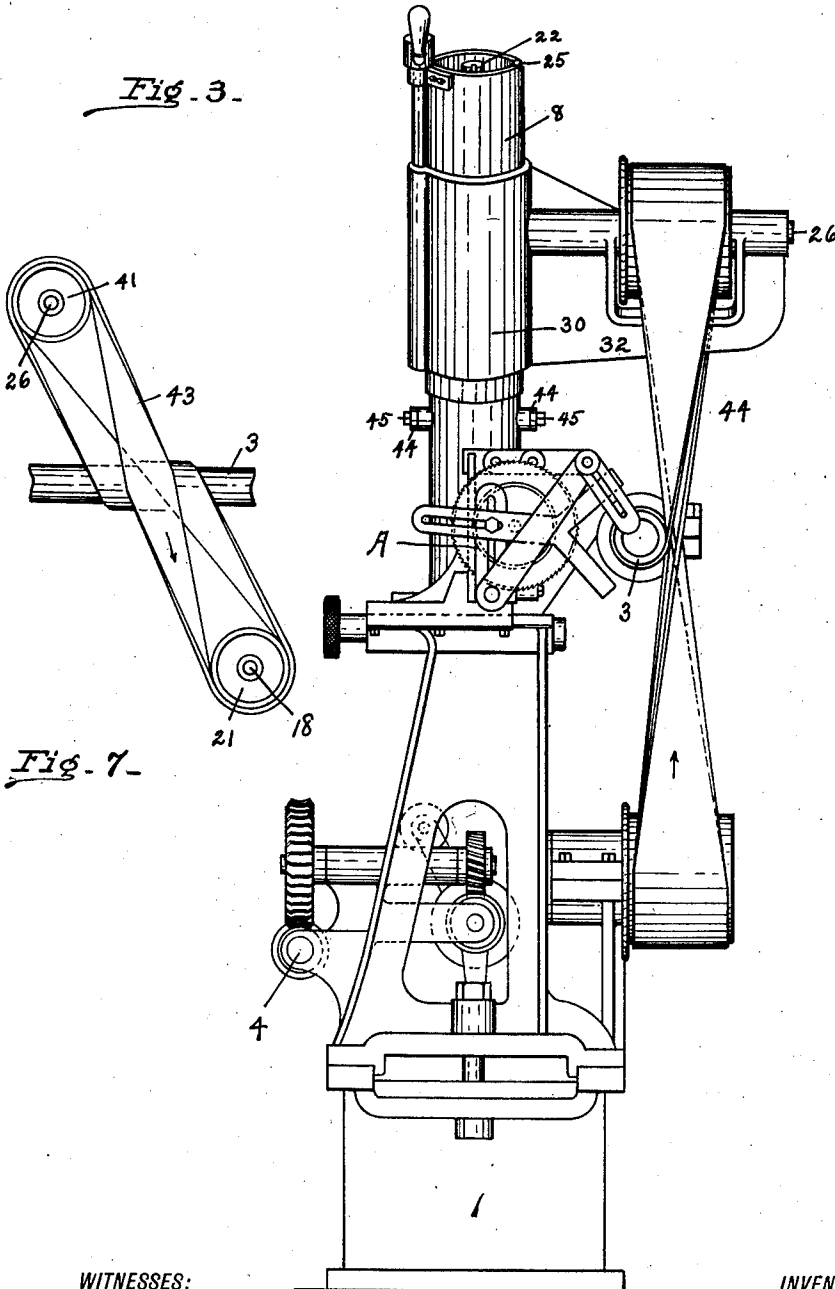


Fig. 7.

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4 SHEETS—SHEET 4.

Fig. 4.

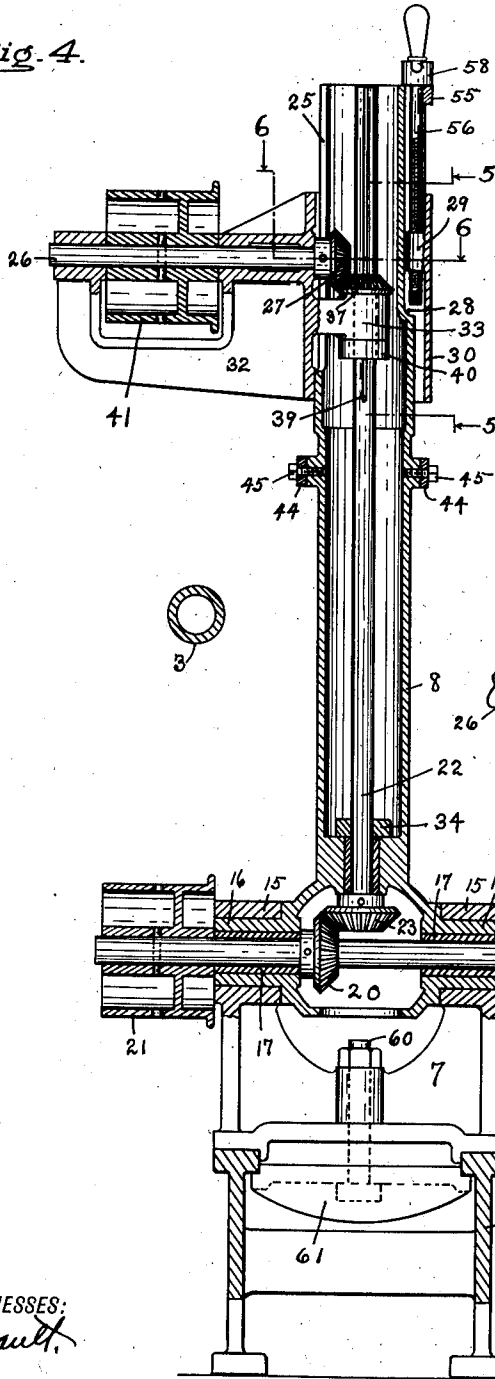


Fig. 5.

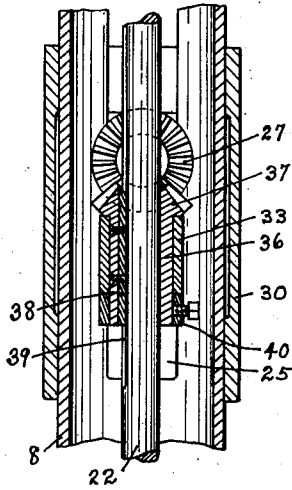
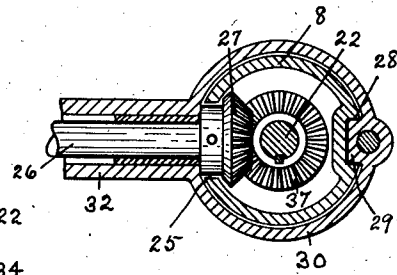


Fig. 6.



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UNITED STATES PATENT OFFICE.

BEN K. FORD, OF DETROIT, MICHIGAN, ASSIGNOR TO DETROIT CAN COMPANY, OF
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TUBE-MACHINE.

1,059,045.

Specification of Letters Patent.

Patented Apr. 15, 1913.

Application filed January 22, 1912. Serial No. 672,549.

To all whom it may concern:

Be it known that I, BEN K. FORD, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Tube-Machine, of which the following is a specification.

This invention relates to means for spirally winding strips of fibrous material such as paper, cloth or straw-board into tubes, and its object is to provide a tube winding machine which will be simple in construction, wherein the operative parts will be readily accessible at all times, and which will require a minimum of floor space.

This invention consists in combination with a base, of novel columns pivotally mounted thereon and carrying pulleys, a rigid mandrel to receive the tube material, and belts to carry the tube material around the mandrel.

It further consists in the novel driving mechanism for the winding belts and in the adjusting means therefor.

In the accompanying drawings, Figure 1 is a side elevation of the tube machine. Fig. 2 is a head-end elevation and Fig. 3 is a rear-end elevation of the machine. Fig. 4 is a transverse section of the machine on a central line of one of the columns. Figs. 5 and 6 are sections on the lines 5-5 and 6-6 respectively of Fig. 4. Fig. 7 is an elevation of a winding belt.

Similar reference characters refer to like parts throughout the several views.

This machine shown in Fig. 1 comprises a tube-winding mechanism which will be hereinafter set forth and a cutting-off mechanism A, which forms the subject matter of my co-pending application Serial Number 673,746, filed January 27th, 1912. It will be understood that any other type of cutting-off mechanism may be employed with this particular winding mechanism.

Mounted on the bed 1 is a head-frame 2 which supports the winding mandrel 3, which is preferably a tube. A main shaft 4 is mounted in the bearing 5 on the head-frame, in the bearings 6 on the pedestals 7 of the columns 8, and in bearings 9 on the frame of the cutting-off mechanism. On this shaft are secured the gear 10, the worms 11, and the driving mechanism of the cutting-off tool. An electric motor 12 may be mounted on the head-frame, with its pinion

13 in mesh with the gear 10. Any other desired means may be employed to revolve the main shaft. Any desired number of these pedestals, columns and belts may be employed, depending upon the number of wraps of tube material to be used. They are shiftable along the bed, the pedestals being secured in any desirable manner, bolts 60 and clamps 61 being shown in Fig. 4. Each pedestal 7 carries bearings 15 for the trunnions 16 of the columns. See Fig. 4. Within the trunnions may be placed the bearing sleeves 17, within which is revoluble the substantially horizontal shaft 18. Secured to the shaft is the worm-gear 19, which meshes with a worm 11 on the main shaft 4. These worms 11 are slidable on the shaft 4 and on the long spline 62 on this shaft. Within the column and also secured to the shaft 18, is a bevel gear 20. On the opposite end of the shaft 18 from the worm 19, is a pulley 21 which receives the winding belt. Revolvably mounted in each column is a shaft 22 which has a bevel gear 23 on its lower end which meshes with the bevel gear 20 on the shaft 18. The upper end of each column is formed with a slot 25 to permit the shaft 26 and the hub of the bevel gear 27 to slide up and down. The column is also formed with a groove 28, as shown in Fig. 6, to permit the nut 29, formed on the inner face of the sleeve 30, to slide up and down, which nut and groove prevent this sleeve from turning on the column.

Projecting from the sleeve 30 is a bracket 32 which carries bearings for the substantially horizontal shaft 26 and also carries a bearing 33 for the vertical shaft 22. Within the bearing 33 is revoluble the long hub 36 of the bevel gear 37, which meshes with the bevel gear 27 on the shaft 26, and the hub of this bevel gear 27 is provided with a key 38, slidable in a groove 39 in the shaft 22 so that this gear always revolves with the shaft 22. A collar 40 on the lower end of the hub 36 holds the hub in its bearing. A pulley 41 is secured to the shaft 26 as shown in the drawings. A collar 34, secured to the shaft 22, prevents the weight of the shaft from forcing the bevel gears 20 and 23 against each other.

The paper or other tube material is fed to the mandrel 3 from the side opposite to the columns. It is then slid around the shaft

spirally by hand until it is engaged by the first winding belt 43. As several thicknesses are usually used to form the tubes, these are all properly started by hand until they are engaged by the first winding belt. The machine is then slowly started and the first belt 43 will continue the winding of the tube. When the spiral has reached the second winding belt 44, this will also engage and assist in the winding, serving also to insure what may be termed, tight wrapping. It will readily be noticed that the pitch of the spirals will depend upon the width of the tube material and the diameter of the tube, so that the angular position of the columns 8 must be varied with each change of material and diameter of the tubing. To properly adjust the columns, links 44 connect the columns and the distances between their pivots 45 must be equal to the distances between the centers of the shafts 18. A screw 46 connects to lugs 47 on the first column, and extends through a nut 48 carried by a sleeve 49, mounted on pins 50, which are carried by the bracket 51. A hand-wheel 52, connected to this nut 48, may be employed to adjust the screw 46 and the angle of the columns. If desired, either of the pulleys of each winding belt may be permitted to run loose, but preferably, both are driven.

When any change is made in the diameter of the tubing manufactured, it becomes necessary to change the distance between the shafts 18 and 26 on the pedestals in order to slacken or tighten the belt. For this purpose the bracket 32 and sleeve 30 are made slidable on each column. At the upper end of each column is a small supporting collar 55, in which is revoluble a screw 56 which engages the nut 29, and a handle 58 secured to the upper end of the screw 56 permits the screw to be turned in either direction and the sleeve 30 and bracket 32 either raised or lowered thereby.

It will be noticed that by this construction the belts 43 and 44 are generally vertical and are readily accessible from one side of the machine, which is not the case where the belts are horizontal and extend transversely to the machine. It will also be seen that access to the mandrel is unobstructed so that the operator can readily start the winding of the tube material.

The floor space required by this machine is very much less than that required by the old type of flat-top machines of the same capacity.

I claim—

1. In a tube machine, the combination of a base, a mandrel mounted thereon, an upright column pivotally mounted on said base, at its lower end, horizontal shafts projecting from said column above and below said mandrel, pulleys on said shafts, a winding belt passing around said pulleys and around the

mandrel, and means for driving one of the pulleys and said belt.

2. In a tube machine, the combination of a base, a mandrel mounted thereon, an upright column pivotally mounted on said base at its lower end, horizontal shafts projecting from said column above and below said mandrel, pulleys on said shafts, a winding belt passing around said pulleys and around the mandrel, and means for driving both of said pulleys and said belt.

3. In a tube machine, the combination of a base, a mandrel mounted thereon, a pedestal mounted on said base and having horizontal bearings, a column on said pedestal and having trunnions journaled in said bearings, means to control the angle between the column and the base, horizontal shafts projecting from said column above and below said mandrel, pulleys on said shafts, a winding belt passing around said pulleys and around the mandrel, and means for driving said belt.

4. In a tube machine, the combination of a base, a head-frame mounted on the base, a mandrel carried by said head-frame, a continuous winding-belt passing around said mandrel, a pair of pulleys, one above and one below the mandrel for driving the belt, a column for supporting the pulleys pivoted on the base at its lower end, a nut pivoted to said head-frame, a screw engaging said nut and connecting to said column, and means to drive said pulleys.

5. In a tube machine, the combination of a base, a head-frame mounted on the base, a mandrel carried by said head-frame, columns pivoted on the base at their lower ends, a pair of pulleys, one above and one below the mandrel mounted on each column, a continuous winding belt passing around said mandrel and each pair of pulleys, a link connecting said columns to hold the same parallel to each other, a nut pivoted to said head-frame, a screw engaging said nut and connecting to the adjacent column, and means to drive said pulleys.

6. In a tube machine, the combination of a base, a mandrel mounted thereon, a series of pedestals mounted on said base and having horizontal bearings, a column mounted on each pedestal and having trunnions journaled in said bearings, means to hold the columns parallel to each other, means to control the angles between the columns and the base, horizontal shafts projecting from each column and below said mandrel, pulleys on said shafts, winding belts passing around said pulleys and around the mandrel, and means for driving said belts.

7. In a tube machine, the combination of a base, a mandrel mounted thereon, a pedestal mounted on said base, a column pivoted on said pedestal, a pair of shafts, one above and one below said mandrel projecting from

said column, a third shaft longitudinally mounted in said column and gears connecting the three shafts, pulleys mounted on the horizontal shafts, a belt passing around the pulleys and around the mandrel, and means to drive said shafts.

8. In a tube machine, the combination of a base, a mandrel mounted thereon, a pedestal mounted on said base, a column pivoted on said pedestal, a pair of shafts, one above and one below said mandrel projecting from said column, a third shaft longitudinally mounted in said column, gears connecting the three shafts, pulleys mounted on the horizontal shafts, a belt passing around the pulleys and around the mandrel, a main driving-shaft mounted on said base, and gears connecting the main shaft and the lower shaft carried by said column.

9. In a tube machine, the combination of a base, a pedestal mounted on said base and having horizontal bearings, a column mounted on said pedestal and having trunnions journaled in said bearings, a horizontal shaft journaled in said trunnions, a pulley on one end of said shaft, a gear on said shaft within the column, a longitudinal shaft mounted in said column, a bracket slidably mounted on said column, a horizontal shaft mounted in said bracket, gears connecting the upper horizontal shaft and the longitudinal shaft, and the longitudinal shaft to the lower horizontal shaft, a pulley on said upper horizontal shaft, a mandrel mounted on said base between said pulleys; a main driving shaft mounted on said base, and gears connecting said main shaft and said lower horizontal shaft.

10. In a tube machine, the combination of a base, a mandrel mounted thereon, a col-

umn pivotally mounted on said base, a horizontal shaft mounted in said column and extending below said mandrel, a sleeve mounted on said column, a screw for adjusting said sleeve, a shaft carried by said sleeve and extending above said mandrel, means to drive the upper shaft from the lower, pulleys on said shafts, a belt extending around said pulleys and said mandrel, and means to drive the lower shaft.

11. In a tube machine, the combination of a base, a mandrel mounted thereon, a pedestal slidably mounted on the base, means to secure the pedestal in proper position, a column pivoted at its lower end on said pedestal, horizontal shafts mounted in said column above and below the mandrel, pulleys on said shafts, a winding belt passing around said pulleys and around the mandrel, and means to drive the shafts.

12. In a tube machine, the combination of a base, a mandrel mounted thereon, a pedestal slidably mounted on the base, means to secure the pedestal in proper position, a column pivoted at its lower end on said pedestal, horizontal shafts mounted in said column above and below the mandrel, pulleys on said shafts, a winding belt passing around said pulleys and around the mandrel, means to drive the shafts, and means to control the angle between the belt and the mandrel.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BEN K. FORD.

Witnesses:

EDWARD N. PAGELSEN,
HUGO W. KREINBRING.