No. 800,649. PATENTED OCT. 3, 1905.

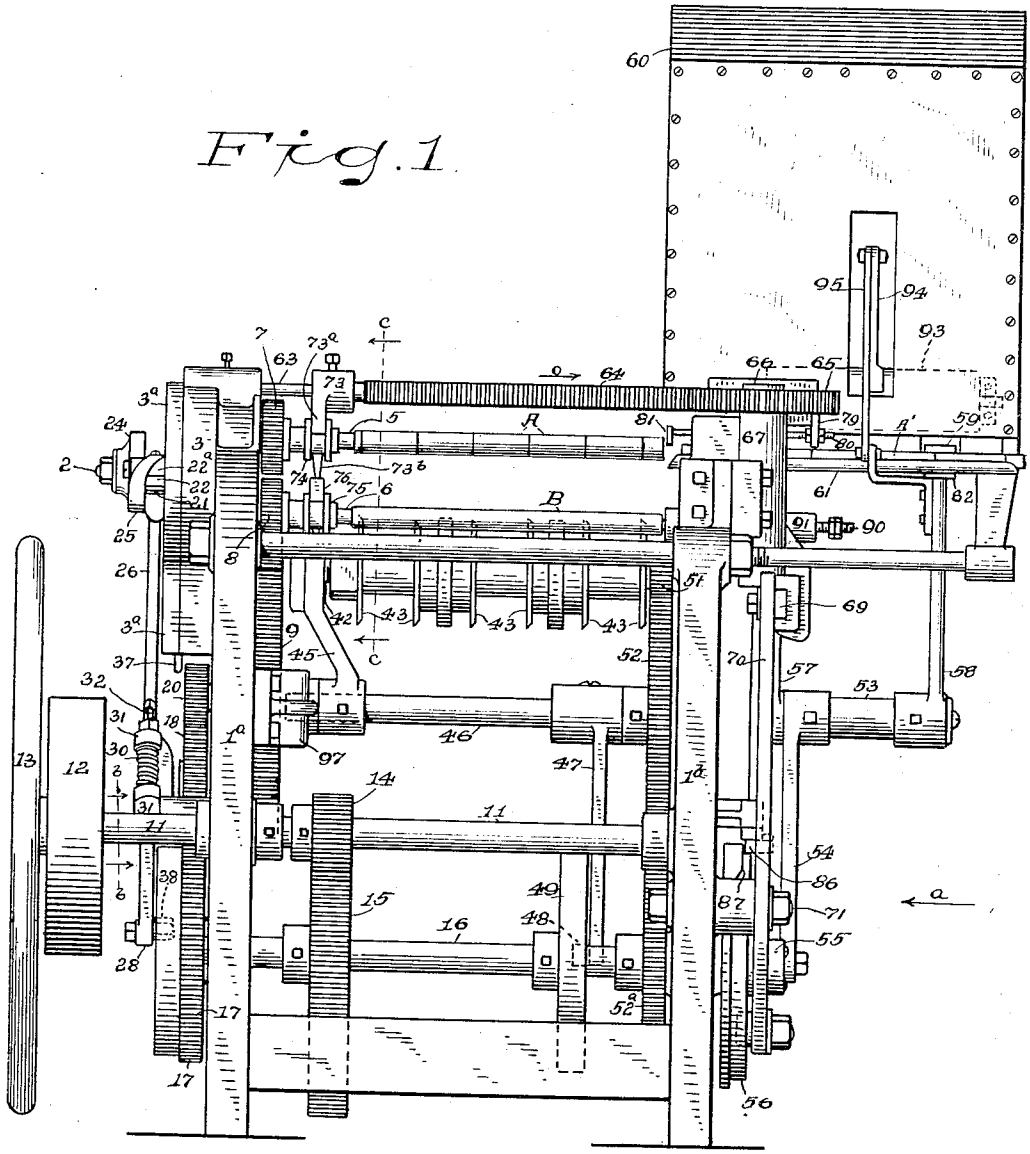
H. J. HURD.

PAPER TUBE CUTTING MACHINE.

APPLICATION FILED MAR. 24, 1904.

4 SHEETS—SHEET 1.

Fig. 1.



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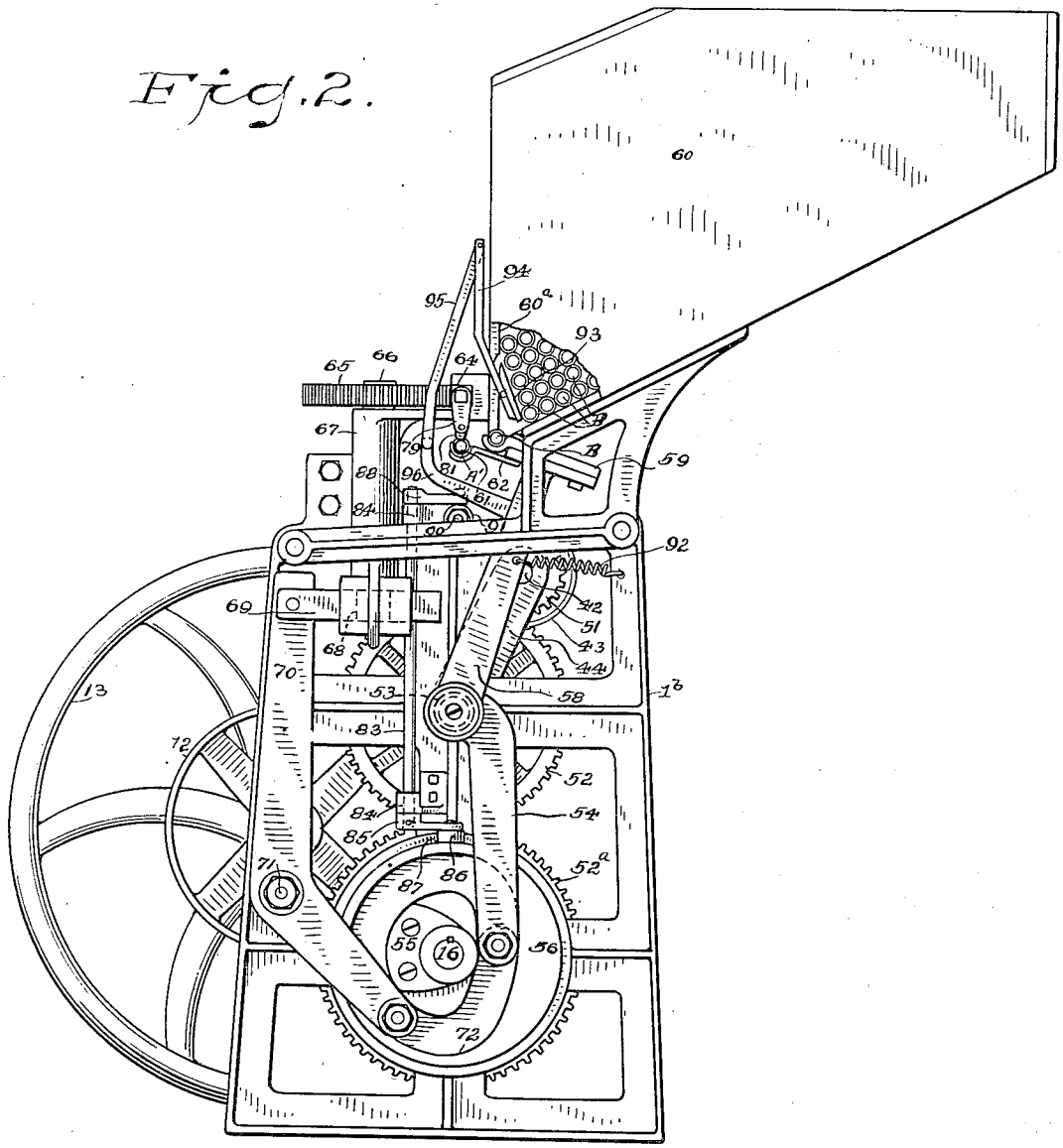
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

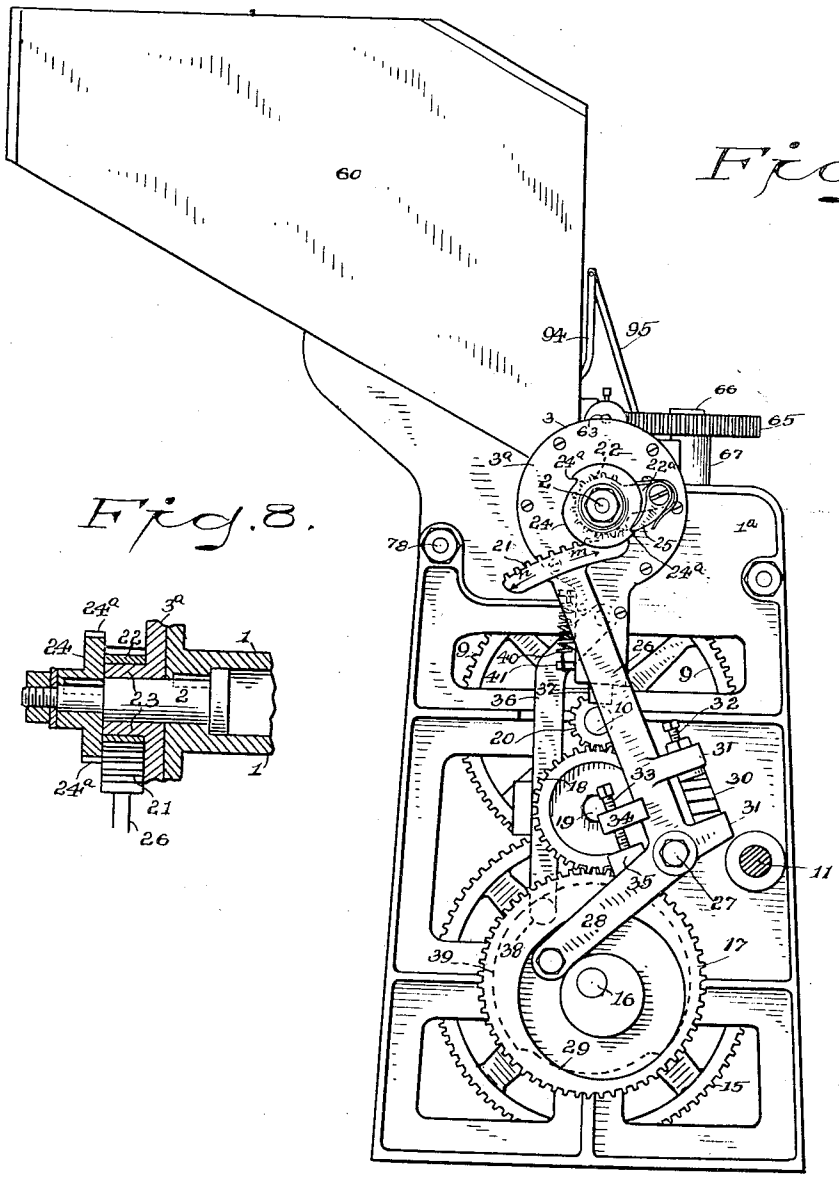


Fig. 8.

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4 SHEETS—SHEET 4.

Fig. 4.

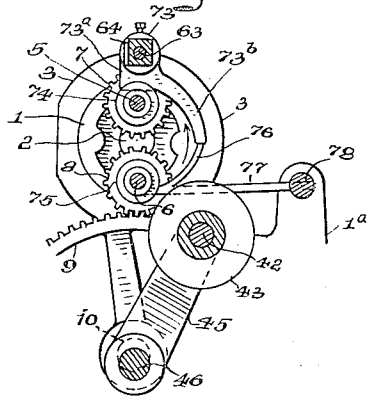


Fig. 9.

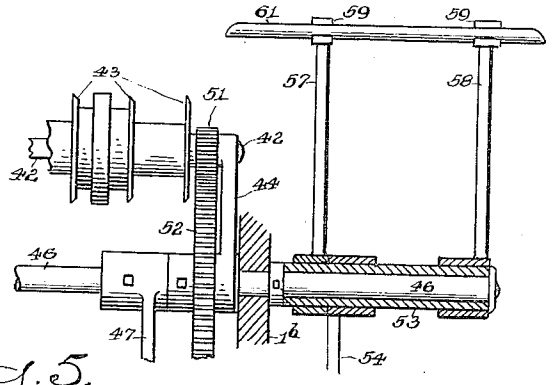


Fig. 5.

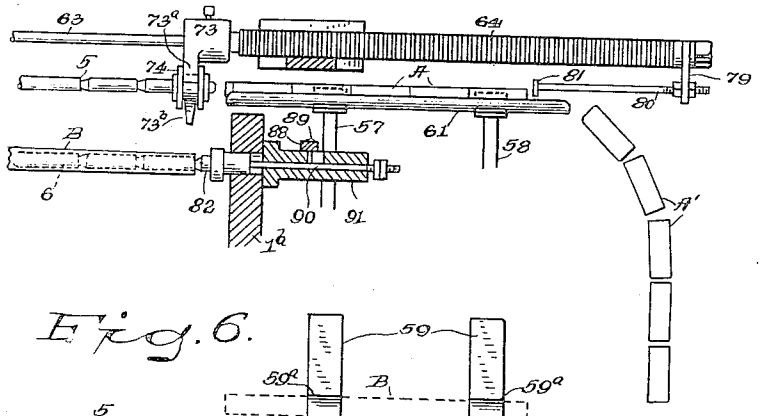
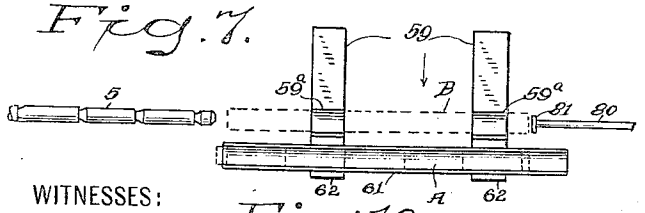


Fig. 6.

Fig. 7.

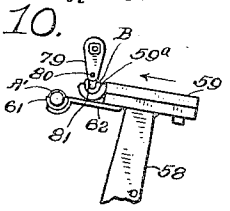


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Fig. 10.



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UNITED STATES PATENT OFFICE.

HOBERT J. HURD, OF BRIDGEPORT, CONNECTICUT.

PAPER-TUBE-CUTTING MACHINE.

No. 800,649. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed March 24, 1904. Serial No. 199,741.

To all whom it may concern:

Be it known that I, HOBERT J. HURD, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Paper-Tube-Cutting Machines, of which the following is a specification.

My invention relates to machines for cutting paper tubes into predetermined lengths; and it is especially adapted for automatically cutting tubes into the proper lengths for paper shot-shells.

My improved machine is of simple construction, cheap, durable, and is capable of turning out an almost continuous product by reason of the fact that while one tube is being severed into short pieces or sections on one arbor the previously-cut tube is discharged from the other arbor.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents a front elevation of the machine. Fig. 2 is a front end elevation of the machine looking in the direction of arrow *a* of Fig. 1 and broken view of the hopper. Fig. 3 is a rear end elevation and sectional view of the driving-shaft on line *b b* of Fig. 1. Fig. 4 is a broken view of one of the side frames of the machine, front elevation of the rotatable head carrying the tube-arbors, pinions on said arbors, broken view of the continuously-running gear with which said pinions alternately engage, sectional view of the tube-arbors, tube-ejecting rack, and cutter-arbor on line *c c* of Fig. 1. Figs. 5, 6, and 7 are detail views of the tube-carriers and arbors, showing the manner in which cut and uncut tubes are entered on the arbors and ejected therefrom. Fig. 8 is a broken sectional view of the arbor-carrying head, rear plate of the housing for said head, sectional view of a segmental pinion mounted on a bearing of said plate, broken view of a segmental gear registering with said pinion, short shaft journaled in said bearing, and sectional view of a notched plate for rotating the said head. Fig. 9 is a broken view of the tube-cutting arbor, driving-gear therefor, shaft carrying said gear, arm for operating said shaft, sectional view of a sleeve thereon to which the tube-carrier arms are secured, and broken sectional view of one of the standards or side frames of the machine. Fig. 10 is a detail broken view of one of the tube-carrier arms, showing the same in a forward position, tube-carrier, and section-receiver thereon.

Its construction and operation are as follows:

1 is an arbor-carrying head rigidly mounted on the short rotatable shaft 2 and within the housing 3 of the side frame or standard 1^a.

5 and 6 are tube-carrying arbors journaled at one end in the head 1. 7 and 8 are pinions secured to these arbors and are adapted to be alternately brought into engagement with the continuously-running gear 9 on the short shaft 10, which shaft is journaled in the standard 1^a. This short shaft is rotated through the medium of the driving-shaft 11, carrying the driving-pulley 12 and hand-wheel 13, as follows: 14 is a pinion on shaft 11, which meshes with the gear 15 on shaft 16, and this shaft carries the gear 17 to mesh with the gear 18, Fig. 3, rotatably mounted on the stud 19 of the standard 1^a, and this latter gear meshes with the pinion 20 on the end of shaft 10.

The arbor-carrying head 1 is intermittently rotated by means of the segment-gear 21, Figs. 1 and 3, engaging with the segment-pinion 22, journaled, Fig. 8, on the lateral projection 23 of the back plate 3^a of the housing 3.

24 is a plate secured to the short shaft 2 and is provided with the diametrically-located notches 24^a.

22^a is an arm projecting from the segment-pinion 22, carrying the spring-actuated pawl 25, adapted to engage with the notches of the plate 24 and intermittently rotate the arbor-carrying head 1.

The segment-gear 21 is mounted on the long arm 26 of a lever pivotally supported on the bolt 27, Fig. 3. The short arm 28 of this lever carries a roll adapted to engage with the cam 29, cut on the vertical face of the gear 17. Owing to the sudden shock produced on the long arm 26 of the segmental gear-lever in its oscillating movement to overcome the inertia of the arbor-carrying head 1, I have provided means on said lever whereby it is prevented from breaking under this shock. When the segmental gear 21 is moved in the direction of arrow *m* to carry the pawl 25 into engagement with the other notch of the plate 24, there will of course be no shock or strain on the lever; but when it is moved in the direction of arrow *n* to overcome the inertia of the head 1 there is more or less strain on the long arm of said lever, especially if one of the teeth of one of the arbor-

pinions should happen to strike on the top of one of the teeth of the continuously-running gear 9. The shock-compensating feature for said lever consists of the spring 30, located between the lugs 31, and its adjusting-screw 32.

33 is an adjusting-screw in the lug 34, with its end resting on the lug 35 of the short arm 28.

The strain and shock that would otherwise be felt on the long arm 26 of the lever is taken up by the spring 30, and the set-screw 33 maintains the normal rigidity of said arm.

The rotatable arbor-carrying head 1 is locked in its two positions (represented by the notches 24ª of the plate 24) by means of the lever 36, whose upper end carries the locking-bolt 37, Figs. 1 and 3, which bolt engages with a notch (not shown) in said head. The lower end of this lever carries the roll 38, adapted to engage with the cam-groove 39 in the inner vertical face of the gear 17.

40 is a spring having one end connected to the pin 41, projecting from the locking-bolt, while its other end is anchored to a fixed point outside, so as to exert an upper pressure or pull on said bolt.

42, Figs. 1, 2, 4, and 9, is the cutter-arbor carrying the cutters 43. This arbor is journaled in the upper end of the arms 44 and 45, and these arms are rigidly secured to the rock-shaft 46. Motion is imparted to this shaft through the medium of the arm 47, carrying the roll 48 at its lower end to engage with a cam-groove (not shown) in the vertical face of the disk 49 on the shaft 16, while the cutter-arbor is rotated through the medium of its pinion 51 and gear 52 on the rock-shaft 46 and the gear 52ª on the shaft 16.

53 is a sleeve loosely mounted on one end of the shaft 46 and is adapted to have a reciprocating movement on said shaft through the medium of the arm 54, secured to said sleeve and carrying a roll at its lower end to engage with the wiping-cam 55, secured to the vertical face of the disk 56, (shown more clearly at Fig. 2,) which disk is secured to the shaft 16.

57 and 58, Figs. 1, 2, and 9, are tube-carrier arms rigidly mounted on the sleeve 53 and are adapted to reciprocate with it. 59 (see also Figs. 6, 7, and 10,) represents the tube-carriers projecting from the free end of these arms, and they are provided with the semicircular recesses 59ª, adapted to receive the uncut tubes from the hopper 60 and carry them forward in line with the upper one of the tube-arbors in the manner presently to be described.

61 is a semicircular receiver mounted on the outer end of the arms 62, adapted to receive the tubular sections from the arbors. These arms are also secured to the upper end of the carrier-arms 57 and 58.

It will be readily understood that instead of making the four separate arms 59 and 62 they could be merged in a single piece of metal, as the main thing desired is to provide two distinct receptacles, one to receive the uncut tubes from the hopper and the other to receive the tubes from the arbors after they have been cut into short sections.

63, Figs. 1, 4, and 5, is a rod anchored in the standard 1ª, and 64 is a rack adapted to have a longitudinal movement thereon through the medium of the horizontal gear 65, (see also Figs. 2 and 3,) mounted on the short vertical shaft 66, journaled in the bearing 67. This vertical shaft is reciprocally rotated through the engagement of the pinion 68 (seen in dotted lines at Fig. 2) with the short rack 69, pivotally connected to the upper end of the lever 70, which lever is pivotally supported on the stud 71 of the upright or standard 1ᵇ. The lower end of this lever carries a roll adapted to engage with the cam-groove 72, formed in the vertical face of the disk 56.

73 is an ejector secured to the inner end of the rack 64, adapted to remove the tube-sections from the upper arbor as follows: 74 and 75 are grooved collars loosely mounted on the tube-carrying arbors 5 and 6, Figs. 1 to 4 and 5, adapted to be alternately engaged by the grooved extension 73ª of the ejector 73. This ejector is always engaged with the grooved collar on the upper arbor, and its engagement with the grooved collar on the lower arbor is effected when said lower arbor is brought uppermost by means of the curved tailpiece 73ᵇ of the ejector coinciding with the curved extension 76 of the rod 77, which rod is anchored in the tie-rod 78. The lower end of this curved extension being always in engagement with the grooved collar on the lower tube-arbor, it will therefore be readily seen that when this lower arbor is brought uppermost the tailpiece 73ᵇ and the extension 76 will serve to guide the grooved collar thereon into engagement with the extension 73ª of the ejector. 79, Figs. 1, 2, 5, and 10, is an arm depending from the outer end of the ejector-rack 64, and it carries the rod 80, adjustably secured thereto. The head portion 81 of this rod is adapted both to remove the cut sections from the receptacle 61 and also to place an uncut tube onto the arbor from which the tubular sections have just been discharged in the manner presently to be described.

The free end of the lower tube-arbor or the arbor in the cutting-field is automatically engaged by the center 82, Fig. 5, as follows: 83, Fig. 2, is a vertical rod journaled in the brackets 84, and it carries at its lower end the arm 85, having the roll 86 adapted to be engaged by the cam portion 87 of the disk 56 to effect a partial rotary movement of said shaft. 88 is an arm on the upper end of said shaft, with its free end embracing the pin 89, projecting from the rod 90, which rod is connected to the center and has a longitudinal movement in the bearing 91. When there-

fore one of the tube-arbors has reached the cutting-field, the center will be automatically engaged therewith and released therefrom as soon as the tube has been cut into sections and the arbor is about to be moved to the upper position.

92 is a spring connecting the carrier-arm 58 with the standard of the machine to keep the tube-receiving grooves 59^a in their normal position under the hopper to receive a tube therefrom.

93 is a tilting gate pivotally supported to the inside wall 60^c of the hopper, Figs. 1 and 2, and it is connected, by means of its outwardly-projecting tailpiece 94, to one end of the link 95, while the other end of this link is pivotally connected to the arm 96 of the carrier-arm 58. When therefore the carrier-arms are carried forward by the partial rotation of the sleeve 53 on the shaft 46, the gate 93 will be tilted to let an uncut tube pass. This tube will fall down against the wall 60^c of the hopper in readiness to drop into the grooves 59^a when the carrier-arms have retreated back to their normal position again.

97, Fig. 1, is a bearing bolted to the standard 1^a to support one end of the shaft 46, while the other bearing for said shaft is, as before mentioned, in the standard 1^b.

Operation: The tube-carrying arbor 5, Fig. 1, has just been carried to its upper position with the tubular sections A thereon, while the arbor 6 is in the cutting-field with the uncut tube B ready to be severed into section by the cutters 43. As soon therefore as the lower arbor is locked in cutting position by means of the automatically-operated center 82 the rack 64 is actuated in the direction of arrow *o* to strip the sections A from the arbor 5. This forward movement of the rack will bring the head 81, which now acts as an ejector, in contact with the sections A', that have previously been deposited in the receiver 61, and discharge them therefrom, as shown at Fig. 5. This forward movement of the rack 64 will also actuate the grooved collar 74 and carry the sections A forward and deposit them in the receiver 61. When this is accomplished and while the head 81 is still in the position shown at Figs. 5 and 6, the carrier-arms 57 58 are actuated forward to bring the tube B, previously deposited in the carrier-grooves 59^a and shown dotted in Figs. 6 and 7, forward in line with the arbor 5. This forward movement of the carrier-arms will also bring the uncut tube B in front of the head 81 and in line with the arbor 5, as shown at Figs. 7 and 10. Now when the rack 64 retreats to its normal position the head 81 will force the uncut tube B onto the arbor 5, and as soon as this is accomplished the tube and section-receiver carrier will be drawn back to their normal positions (shown at Fig. 2) by means of the spring 92 to receive another tube from the hopper and sections from the next tube-holding arbor. While the operation of removing the sections from the receiver 61 and also from the arbor and the further operation of placing a fresh tube on the upper arbor is going on, the cutters 43 are brought into engagement with the tube B on the arbor 6 to sever said tube into the required number of short tubular sections, and when this cutting is accomplished the center 82 is also retreated from said arbor, so that the instant the rack 64 has reached its normal position the arbor-carrying head 1 is rotated to bring the arbor 6 with its sections uppermost and the arbor 5 with its uncut tube into the cutting-field. The above-described operation of removing the sections from one of the arbors and putting a fresh tube thereon is automatically continued as long as an uncut tube remains in the arbor.

It is not necessary to employ the head 81 to remove the tubular sections from the receiver 61 in order to make room for the sections on the arbor, as the sections being discharged from the arbor will push off those sections that have been previously deposited in the receiver and take their place; but said head or its equivalent is necessary to place a fresh tube on an arbor.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a paper-tube-cutting machine of the character described, comprising an intermittently-rotatable head carrying rotatable tube-holding arbors journaled therein, pinions on said arbors, a continuously-running gear with which said pinions alternately engage, cutters adapted to be brought against an uncut tube on one of said arbors, means for temporarily locking said head against rotation while the cutting is being done, for the purpose set forth.

2. The combination, in a paper-tube-cutting machine, comprising an intermittently-rotatable head carrying tube-holding arbors rotatably mounted therein, reciprocally-operating cutters, means for temporarily locking said head against rotation when a tube is being severed into sections, automatic means for removing the tubular sections from the arbor located outside of the cutting field, a receiver into which said sections are temporarily discharged from said arbor, for the purpose set forth.

3. In a paper-tube-cutting machine of the character described, the combination of an intermittently-rotatable head carrying tube-holding arbors journaled therein, a pinion for each of said arbors, a continuously-running gear located outside of said head, a reciprocating arbor carrying cutters, said gear adapted to be engaged by the pinion of the arbor on which a tube is being cut while the other arbor and the said head remain stationary, means for automatically locking said head

while a tube is being cut into sections and unlocking the same, means for ejecting the sections from the stationary arbor, for the purpose set forth.

4. In a paper-tube-cutting machine of the character described, the combination of an intermittently-rotatable head carrying tube-holding arbors, pinions on said arbors, a continuously-running gear with which said pinions are alternately brought into engagement, a rock-shaft carrying an arbor having cutters thereon, said cutters adapted to be brought into engagement with a tube on the rotating tube-arbor to sever the same into sections, means for removing the tubular sections from the stationary tube-arbor, a receiver into which said tubular sections are discharged, means for removing said sections from said receiver, for the purpose set forth.

5. The combination, in a paper-tube-cutting machine, comprising an intermittently-rotatable head carrying tube-holding arbors journaled therein, means for alternately rotating said arbors while in the cutting field, a rock-shaft carrying a reciprocating arbor, cutters on said arbor, a sleeve on said shaft, means for oscillating said sleeve independent of said rock-shaft, a tube-carrier and tubular-section receiver actuated by said sleeve, means for removing the sections from said receiver and from the stationary tube-holding arbor to the receiver, and from the tube-carrier to said arbor, for the purpose set forth.

6. The combination, in a paper-tube-cutting machine, comprising intermittently-revoluble and intermittently-rotatable tube-holding arbors, a reciprocating arbor carrying cutters, said cutters adapted to sever a tube on the rotating arbor into sections, a rack carrying an ejector adapted to remove the tubular sections from the stationary tube-holding arbor, a reciprocating tube-carrier and tubular-section receiver, means on said rack to place an uncut tube on said stationary tube-holding arbor, for the purpose set forth.

7. The combination, in a paper-tube-cutting machine, comprising intermittently-revoluble and intermittently-rotatable tube-holding arbors, reciprocating cutters adapted to sever a tube on the rotating arbor into tubular sections, a reciprocating tube-carrier and tubular-section receiver, a tubular-section ejector adapted to strip the sections from the stationary tube-holding arbor and deposit them in said receiver, means for removing the previously-deposited sections from the receiver, and means for forcing a tube onto the stationary tube-holding arbor, for the purpose set forth.

8. The combination, in a machine for cutting paper tubes, comprising intermittently-revoluble and intermittently-rotatable tube-holding arbors, a reciprocating cutter-holding arbor adapted to be automatically brought into engagement with a tube on the rotating tube-holding arbor and sever the same into sections, an ejector for removing the tubular sections from the stationary tube-holding arbor, a hopper for holding a quantity of tubes, a reciprocating tube-carrier to receive a tube from the hopper and carry it in line with said stationary arbor, and means for pushing said tube onto said arbor, for the purpose set forth.

9. The combination, in a machine for cutting paper tubes into predetermined lengths, comprising intermittently-revoluble and intermittently-rotatable tube-holding arbors, a reciprocating cutter-holding arbor adapted to be automatically brought into engagement with a tube on the rotating tube-holding arbor to sever the same into sections, a reciprocating rack carrying an ejector adapted to remove the sections from the stationary arbor, a hopper for uncut tubes, a reciprocating tube-carrier adapted to receive a tube from the hopper and carry it in line with the stationary tube-holding arbor, means connected with said rack to push the tube from said carrier onto said stationary arbor when the rack is retreating to its normal position, for the purpose set forth.

10. The combination, in a machine for cutting paper tubes into predetermined lengths, comprising intermittently-revoluble and intermittently-rotatable tube-holding arbors, one of said arbors remaining stationary while the other is rotating, a reciprocating cutter-holding arbor for cutting the tube on the rotating tube-holding arbor into sections, an ejector for removing tubular sections from the stationary tube-holding arbor, a temporary receiver for said sections, a hopper for uncut tubes, a tube-carrier adapted to receive a tube from said hopper, said carrier actuated to bring the tube in line with said stationary arbor and the receiver out of alinement therewith, means for pushing said tube on said arbor, and means for returning the tube-carrier back to its normal position with respect to the hopper, and the receiver in alinement with said stationary tube-holding arbor, for the purpose set forth.

11. The combination, in a machine for cutting paper tubes, comprising intermittently-rotatable tube-holding arbors adapted to be intermittently revolved about a common center and carrying grooved collars, a section-ejector with which said collars are alternately brought into engagement, a guide to facilitate such engagement, for the purpose set forth.

12. The combination, in a paper-tube-cutting machine, with an intermittently-rotatable head carrying rotatable tube-holding arbors journaled therein, pinions on said arbors, a continuously-running gear with which said pinions alternately engage, a shaft supporting said head, a segmental pinion journaled about said shaft and carrying an arm and pawl, a notched plate on said shaft with which said pawl is adapted to engage, of a pivotally-sup-

ported lever having two arms one of which carries a segmental gear adapted to engage with the segmental pinion, means for actuating said lever through the medium of its other or shorter arm, lugs 31 on said lever, spring 30 between said lugs, lug 34 carrying adjusting-screw 33 adapted to engage lug 35 on said shorter arm so that, through the instrumentality of said spring and adjusting-screw, the lever is relieved of shock or strain when the arbor-pinions are brought into engagement with the continuously-running gear, for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 21st day of March, A. D. 1904.

HOBERT J. HURD.

Witnesses:

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