O. H. ROESSLING.

ELECTRIC CUTTER FOR PAPER TUBE MACHINES.

APPLICATION FILED FEB. 20, 1918.

1,360,029.

Patented Nov. 23, 1920.

8 SHEETS—SHEET 1.

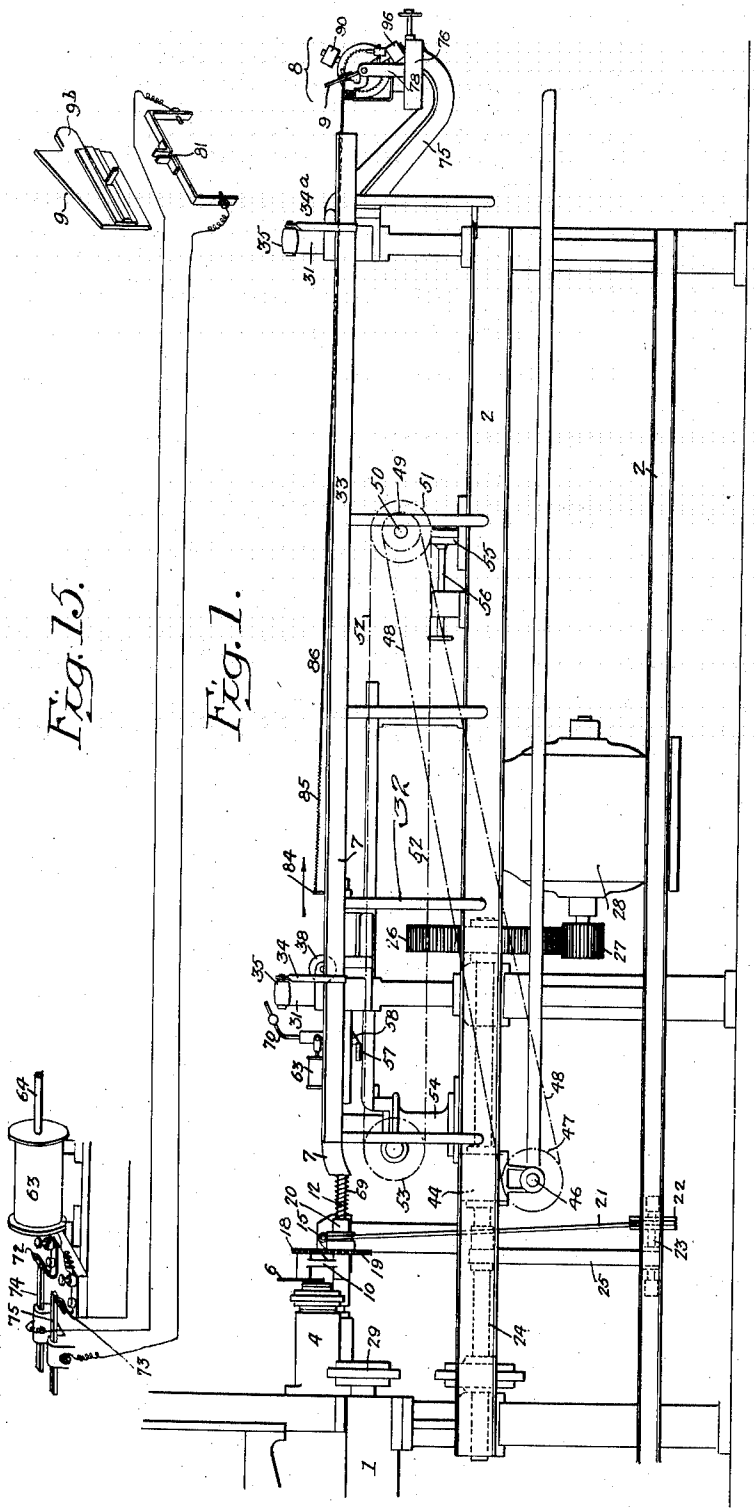


Fig. 1.

Fig. 1a.

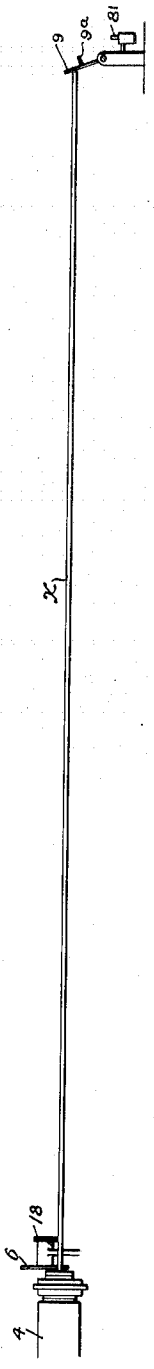


Fig. 2.

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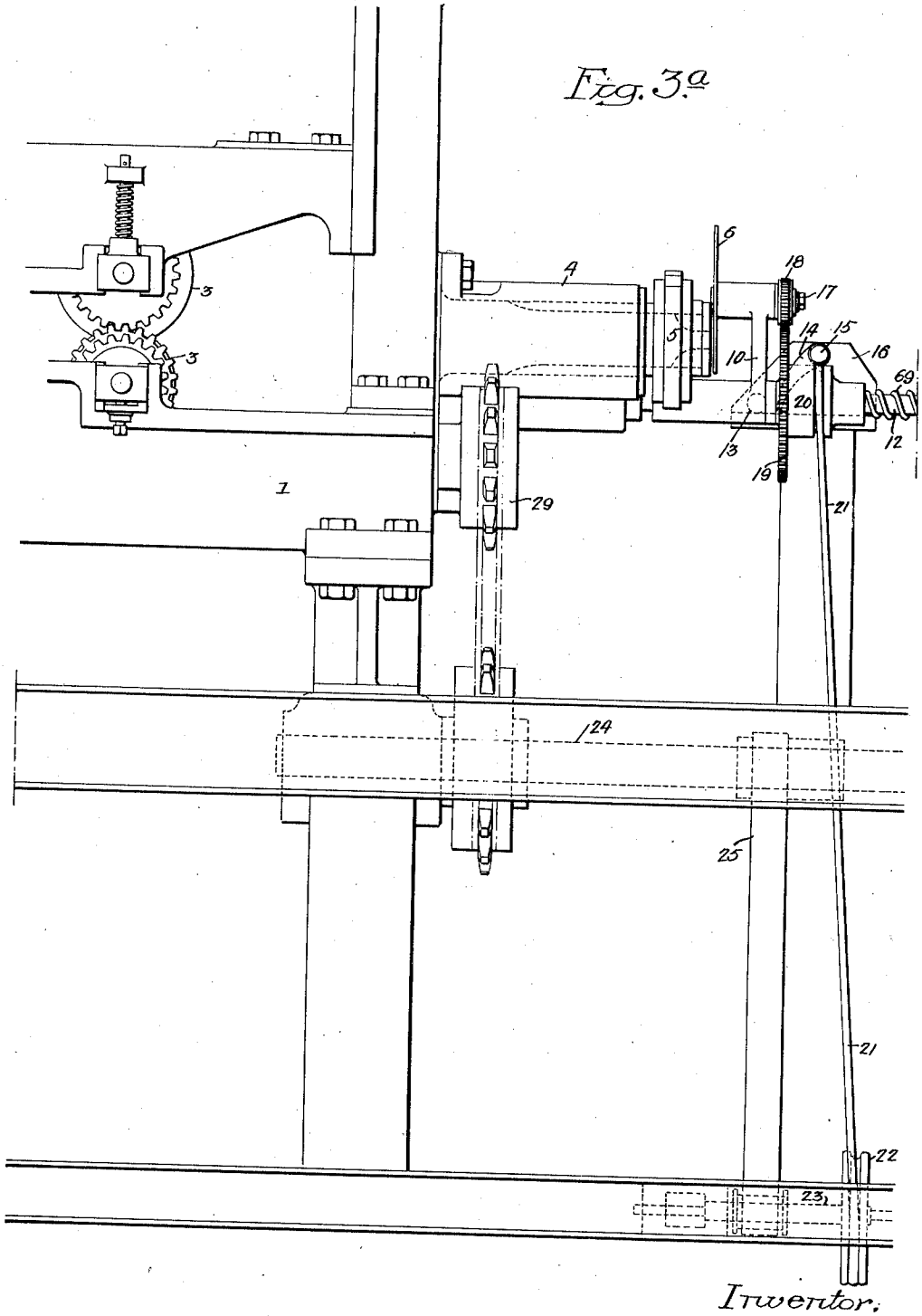
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8 SHEETS—SHEET 2.

Fig. 3a



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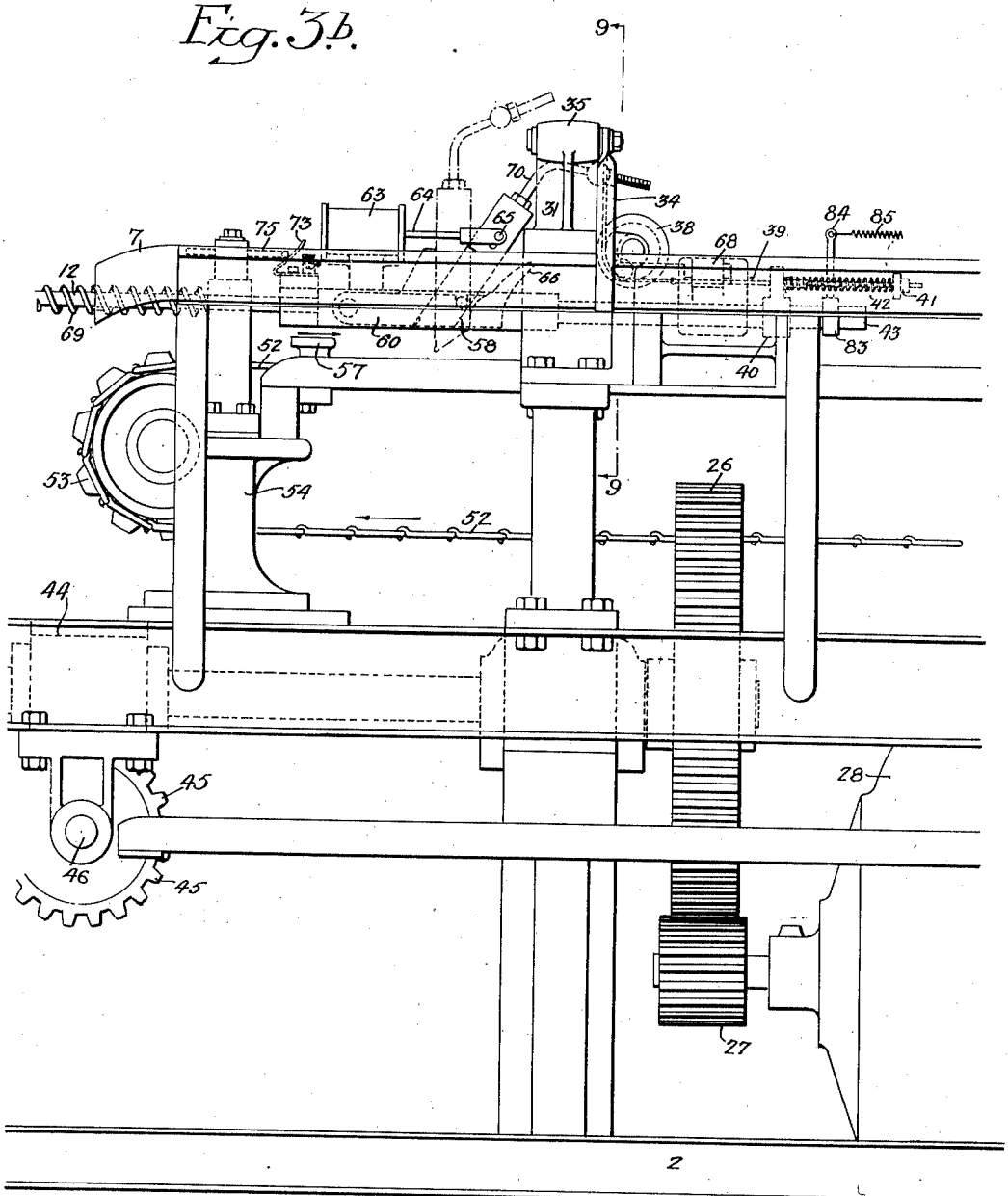
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8 SHEETS—SHEET 3.

Fig. 3b.



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Fig. 6.

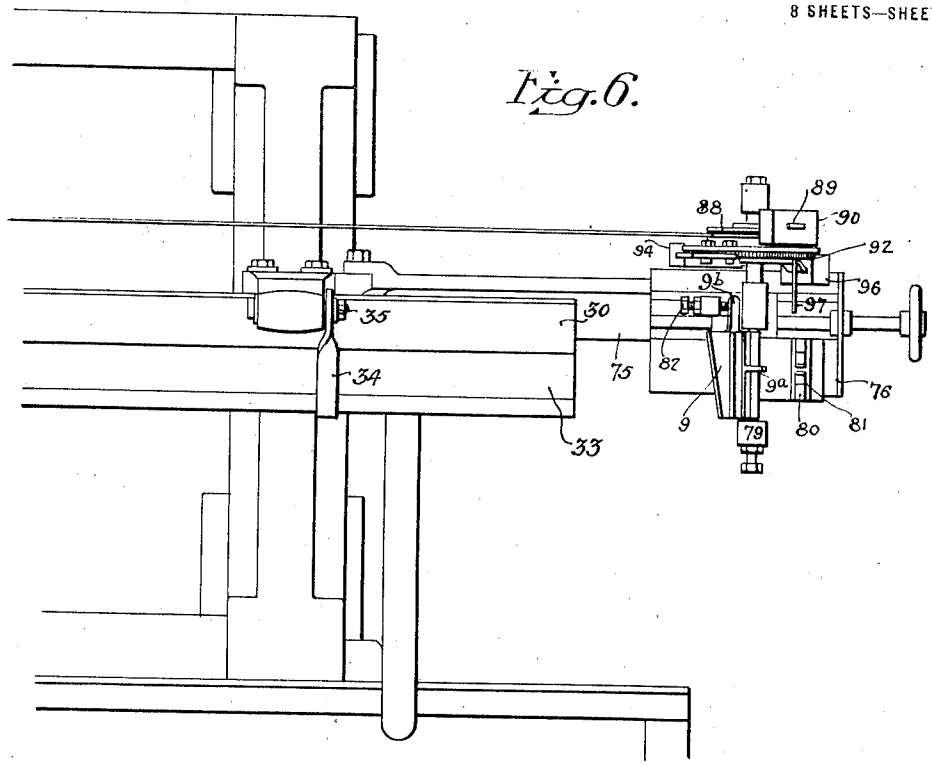
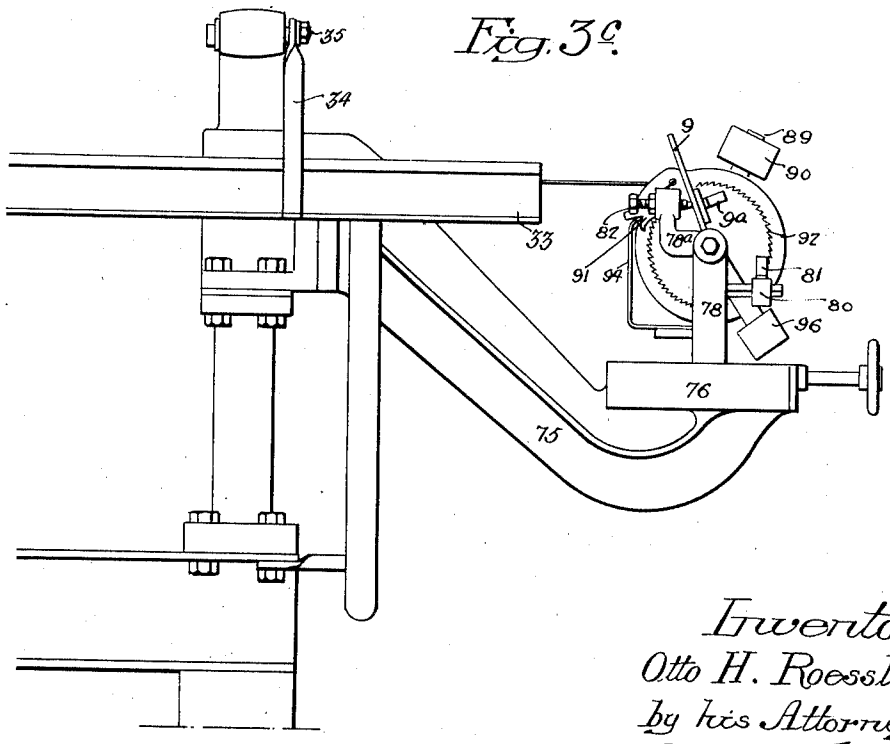


Fig. 3c.



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Fig. 4.

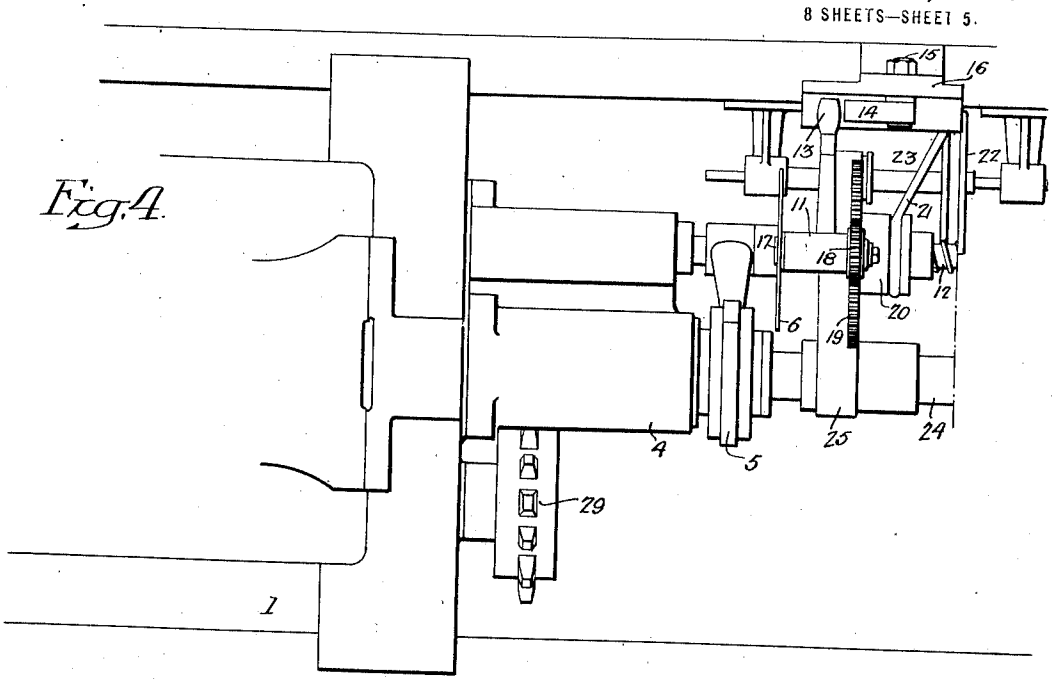
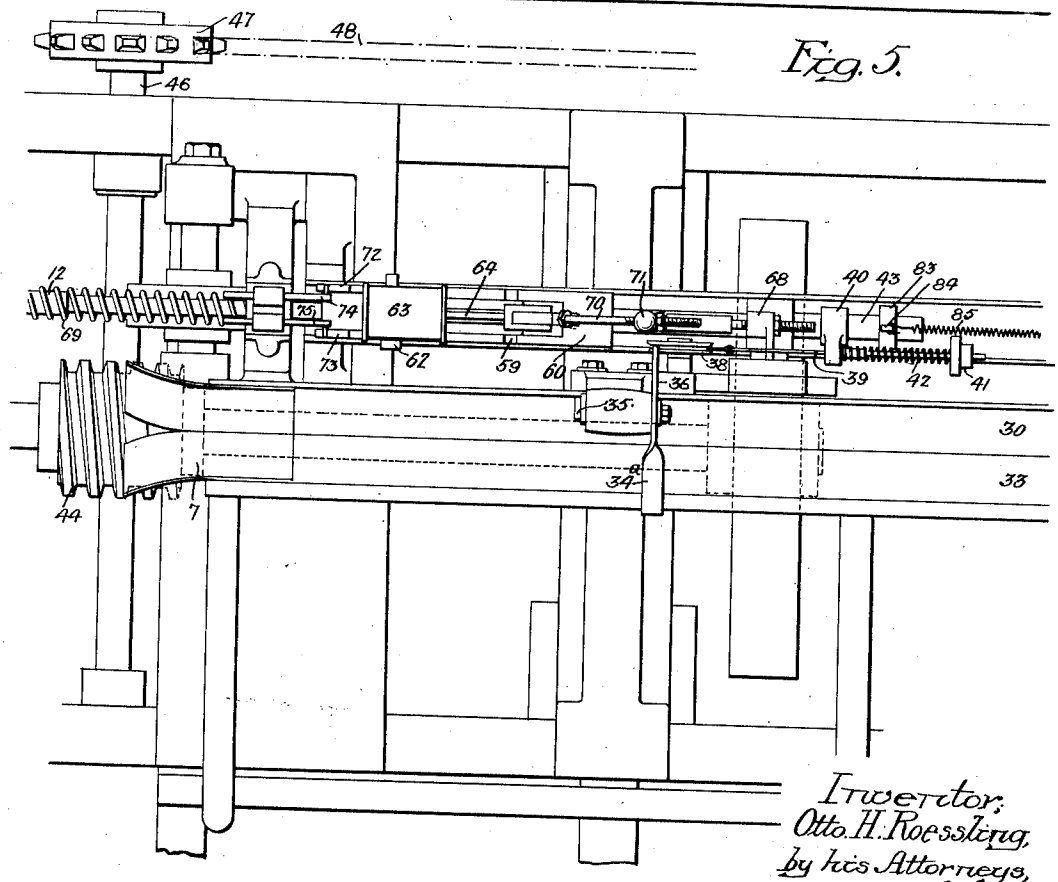


Fig. 5.



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Fig. 8.

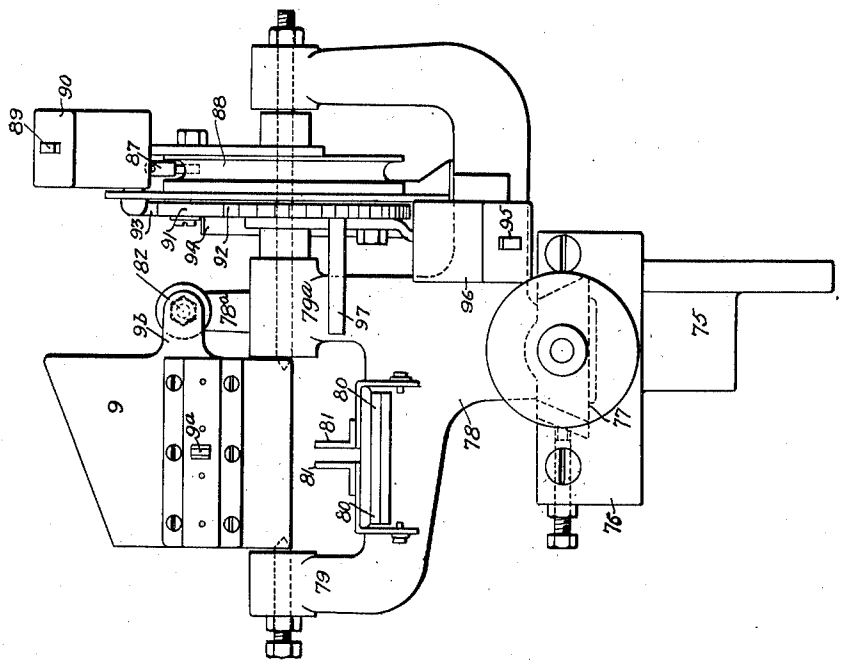


Fig. 16.

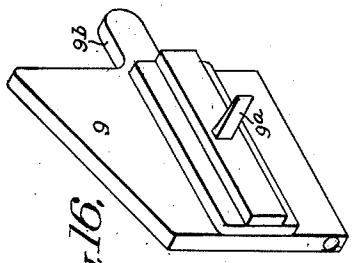
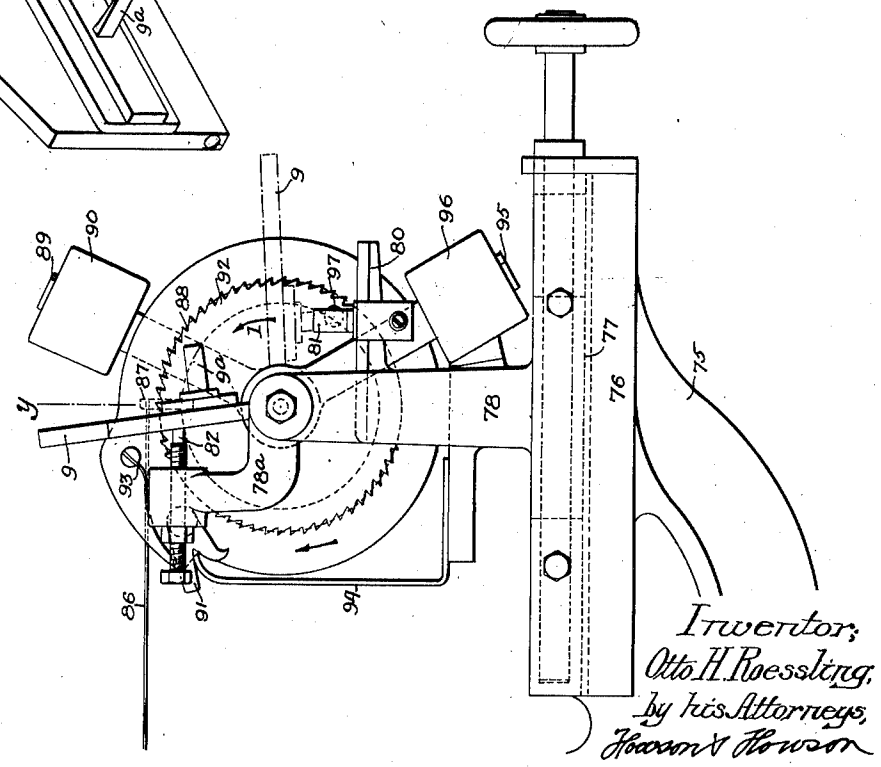


Fig. 7.



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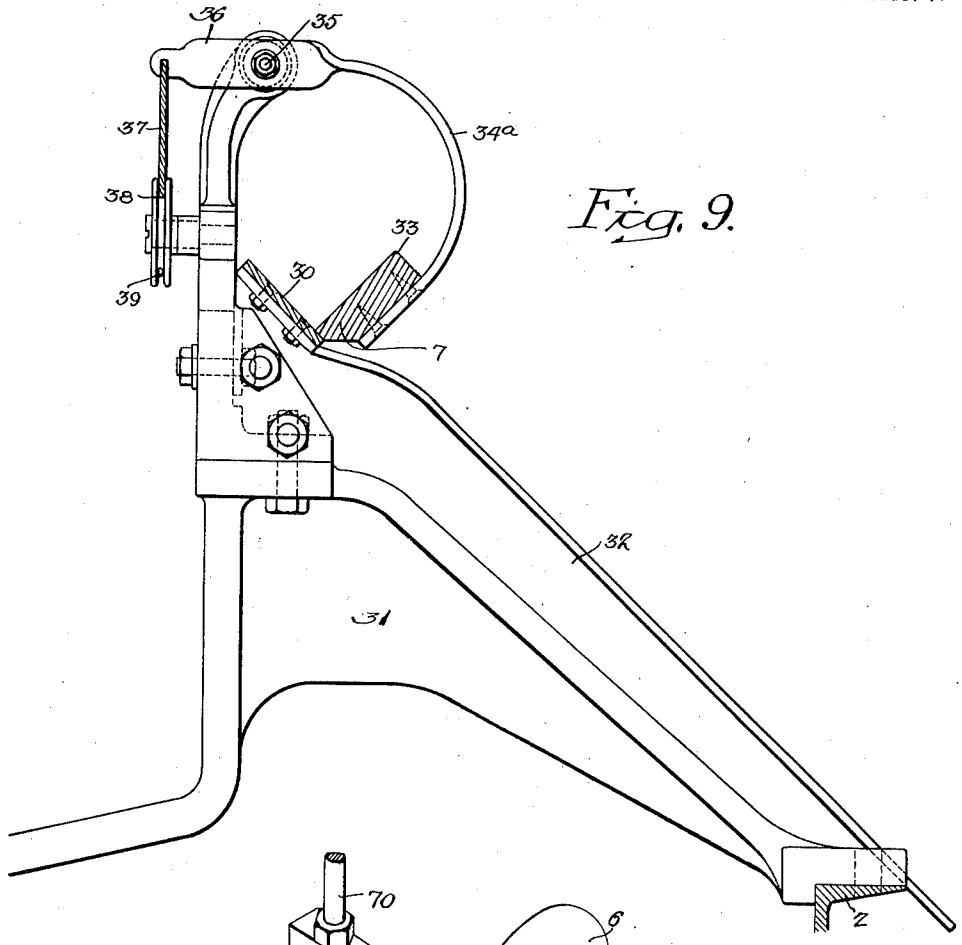


Fig. 9.

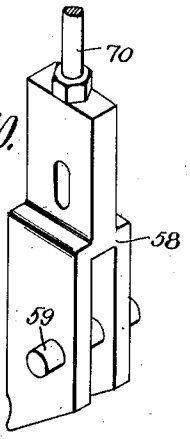


Fig. 20.

Fig. 19.

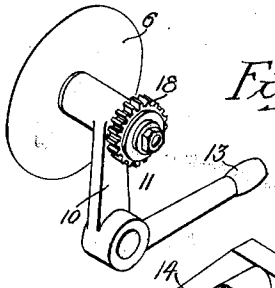


Fig. 17.

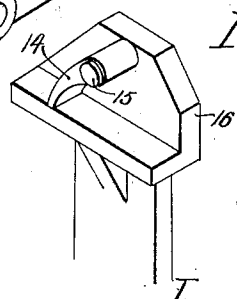
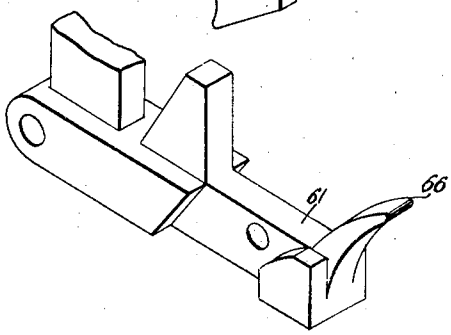


Fig. 18.



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8 SHEETS—SHEET 8.

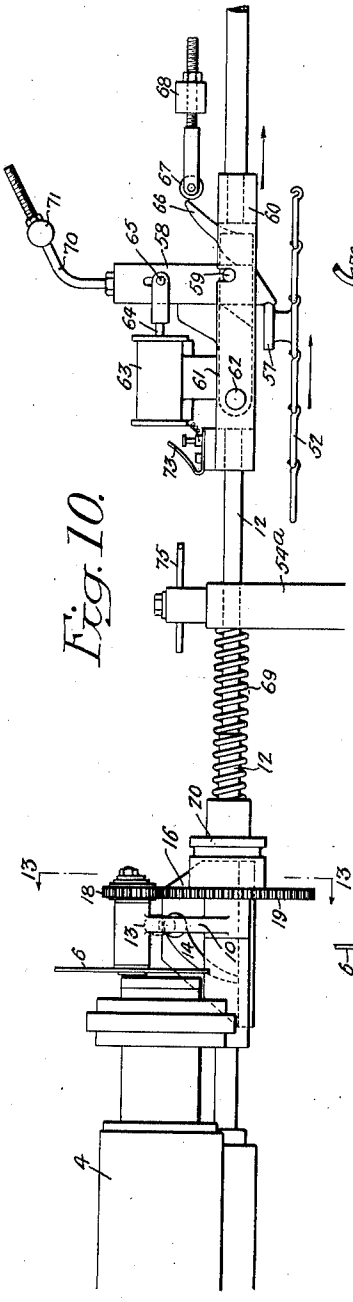


Fig. 10.

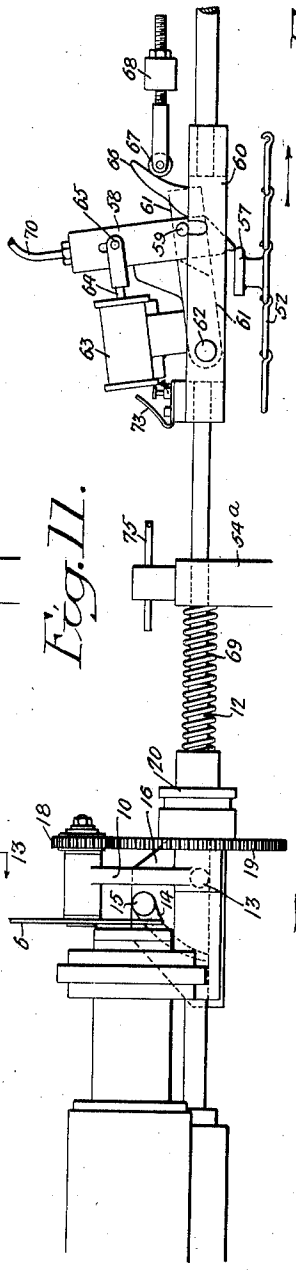


Fig. 11.

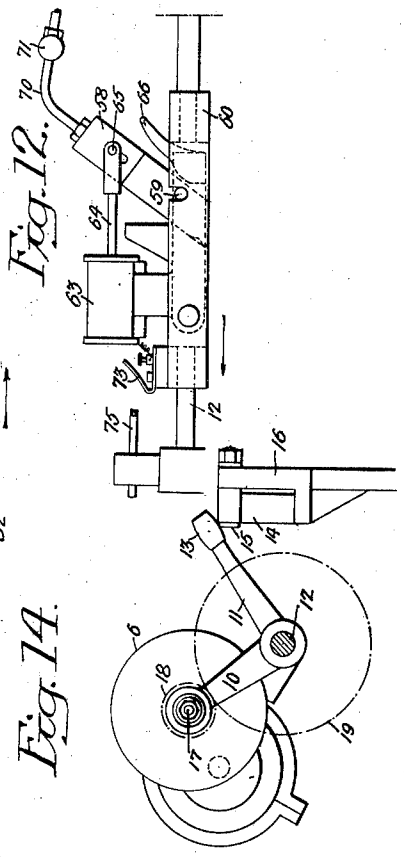


Fig. 12.

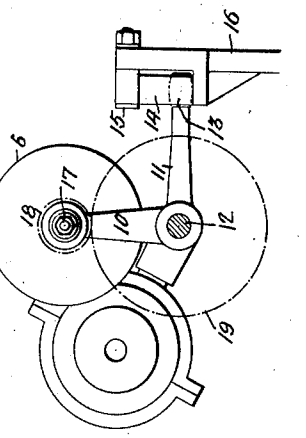


Fig. 14.

Fig. 13.

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UNITED STATES PATENT OFFICE.

OTTO H. ROESSLING, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO CHARLES BECK COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A FIRM COMPRISING CHARLES BECK, CHARLES J. BECK, A. S. BECK, H. P. BECK, LEONIDAS BECK, AND ANDREW SIMON.

ELECTRIC CUTTER FOR PAPER-TUBE MACHINES.

1,360,029. Specification of Letters Patent. Patented Nov. 23, 1920.

Application filed February 20, 1918. Serial No. 218,292.

To all whom it may concern:

Be it known that I, OTTO H. ROESSLING, a subject of the King of Belgium, (having declared my intention of becoming a citizen of the United States,) and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Electric Cutters for Paper-Tube Machines, of which the following is a specification.

My invention relates to certain improvements in machines for automatically cutting paper tubes into lengths and is designed to be attached to, or to form a continuation of, a tube forming machine, such as set forth in the patent granted to me on the second day of July, 1918, No. 1,271,370.

One object of the invention is to design a machine which will cut off tubes, all of a given length by electrically operated mechanism.

A further object of the invention is to provide automatic means for controlling the tube itself.

The invention also relates to improvements in details, which will be fully described hereinafter, reference being had to the accompanying drawings, in which:

Figure 1 is a side view of my invention applied to the rear end of a tube forming machine;

Fig. 2 is a view, in diagram, illustrating the tube actuating the automatic mechanism;

Fig. 3ª is an enlarged side view illustrating a portion of the tube forming machine and the rotary blade for cutting the tube;

Fig. 3ᵇ is a side view forming a continuation of Fig. 3ª, illustrating the chain and releasing mechanism;

Fig. 3ᶜ is a side view of the end of the machine, showing the tripping mechanism;

Fig. 4 is a plan view of a part of the machine illustrated in Fig. 3ª;

Fig. 5 is a plan view of a part of the machine illustrated in Fig. 3ᵇ;

Fig. 6 is a plan view of part of the machine illustrated in Fig. 3ᶜ;

Fig. 7 is an enlarged side view illustrating the tripping mechanism more clearly;

Fig. 8 is an end view of the tripping mechanism looking in the direction of the arrow, Fig. 7;

Fig. 9 is a sectional view on the line 9—9, Fig. 3ᵇ;

Fig. 10 is a diagrammatic side view showing the chain engaging the releasing mechanism;

Fig. 11 is a side view, similar to Fig. 10, showing the chain, pulling the releasing mechanism to its extreme position;

Fig. 12 is a view similar to a portion of Fig. 10, showing the releasing mechanism in its extreme return position;

Fig. 13 is a sectional view on the line 13—13, Fig. 10, showing the cutter out of action;

Fig. 14 is a view showing the cutter moved to the cutting position;

Fig. 15 is a diagram view illustrating the electric wiring;

Fig. 16 is a detached perspective view of the trip plate of the tripping mechanism;

Fig. 17 is a detached perspective view of the cutter and its lever;

Fig. 18 is a view showing the cam for moving the cutter across the face of the die to cut off the tube;

Fig. 19 is a detached perspective view of the pivoted block; and

Fig. 20 is a detached perspective view of the trip lever of the releasing mechanism.

Referring to the drawings, 1 is the frame of a tube forming machine, such as that illustrated in the above mentioned patent. 2 is the frame of the cutting off mechanism to which my invention relates. 3, 3 are the final rolls of the tube forming machine. 4 is a guide through which the finished tube is fed, and this guide is reduced at 5 to about the diameter of the tube so that the tube will be held in the proper position to be cut by the rotating blade 6, which will be described hereinafter. 7 is a trough into which the tube is fed from the tube forming machine, and at the end of this machine is trip mechanism 8 having a plate 9 located in the path of the tube so that when the tube x strikes this plate, as in Fig. 2, it actuates the electric mechanism which controls the cutting off mechanism and which opens the trough and allows the tube to be discharged at one side of the machine.

The mechanism above set forth is intended to cut tubes of a given length and while it can be adjusted, the adjustment is limited and if tubes of other lengths are desired a separate machine is used in which the distance between the die 4 and the tripping

plate is greater or less, according to the length desired for the finished tube.

The machine of the above entitled patent makes what is known as a continuous tube, *i. e.*, a tube of considerable length from strips of paper assembled in tubular form and pressed into shape. This continuous tube must be cut into given lengths, the length depending entirely upon the use for which the tube is intended. The tube, after passing between the rolls, Fig. 3ª, as before remarked, passes through the die 4 and out through said die onto the trough 7.

The cutter illustrated in Figs. 3ª, 10, 11, 13 and 14, is circular in form and has a sharp edge and is mounted on an arm 10 of a lever 11 pivoted on a shaft 12 adapted to bearings in the frame of the machine. The end 13 of the lever 11 is adapted to ride upon a cam 14 pivoted at 15 to the arm 16, Fig. 4, and return under the cam so that when the lever carrying the cutter is moved away from the die 4, the arm 13 rides upon the cam 14, forcing the cutter toward the projecting tube and moves in front of the die, cutting the tube off at the proper point. The movement of the tube is substantially continuous and the short longitudinal movement of the cutter lever allows the cutter to act and to cut the tube at right angles to its length, thus insuring a clean cut of the tube.

On one end of the cutter shaft 17 is a pinion 18 which meshes with a gear wheel 19, loose on the shaft 12, and on the hub of this gear wheel 19 is a grooved pulley 20, over which passes a belt 21 from a grooved pulley 22 on a jack shaft 23 mounted in the lower portion of the frame. This shaft is driven from the main shaft 24 by a belt 25. The main shaft 24 is mounted in bearings on the frame 2 and on this shaft is a gear wheel 26 which meshes with a pinion 27 on the shaft of a motor 28, the motor in the present instance being an electric motor. The shaft 20 also drives the shaft 29 of the tube forming machine, in the present instance.

The driving shaft 29 in turn drives the lower roll of the pair of rolls 3, which are the final rolls of the tube forming machine. These rolls feed the tube toward the cutting mechanism. This construction is fully described in the patent hereinbefore mentioned.

The trough 7 is made in two parts, as clearly shown in Fig. 9. One part 30 is fixed and is secured to a bracket 31 secured to the frame 2 and has a series of guide rods 32 spaced a given distance apart and inclined, as clearly shown in Fig. 9, so as to carry the discharged tube to one end of the machine. The other half 33 of the trough is carried by arms 34, 34ª pivoted at 35 to the brackets 31. The arm 34ª has an extension 36 to which is adapted a cord 37, which passes around a pulley 38 and is connected to a rod 39, which extends through a bearing 40, and this bearing has a head 41. On the rod is a coiled spring 42. This spring is inactive and merely acts as a buffer when the rod 43 carrying the bearing 40 is moved longitudinally in the direction of the arrow, Fig. 5, so that when the parts are in the position illustrated in said figure the trough is closed, retaining the tube until it is cut off, when the mechanism will be operated which will cause the trough to open and to discharge the cut off tube.

The shaft 12 is secured at one end to a slide head 60 and projecting from this slide head at the opposite end is a rod 43.

On the driving shaft 24 is a worm 44, which meshes with a worm wheel 45 on a shaft 46 and on this shaft is a sprocket wheel 47 around which passes a chain 48 to a sprocket wheel 49 on a shaft 50. On this shaft 50 is a sprocket wheel 51 around which passes a chain 52 which also passes around a sprocket wheel 53, the shaft of which is mounted in a fixed bearing 54. The shaft 49 is mounted in an adjustable bearing 55, which can be adjusted by a screw 56 in the ordinary manner so as to take up the slack due to the wear of the chains. On the chain 52 are one or more lugs 57, which come in contact with a forked trip lever 58 which straddles the block 61 pivoted at 62 to the slide head 60. On this block 61 is mounted a solenoid magnet 63, the armature 64 of which is connected by a pin 65 to the lever 58, the pin passing through a slot in said lever. The pivot pin 59 on which the trip lever 58 is mounted on the block 61 extends at each side and is adapted to notches in the slide head so as to limit the downward movement of the block 61 and the trip lever.

When the traveling lug 57, which moves in the direction of the arrow, Fig. 10, comes in contact with the trip lever 58, it moves the block 61 at the same speed as the tube, as indicated in Fig. 11, and when the horn 66 on the block comes in contact with the fixed roller 67 secured to a bracket 68 on the frame of the machine it is forced up by the roller, Fig. 11, and the trip lever is gradually released from the lug 57, as illustrated in Fig. 11, and a spring 69, which is located between the hub 20 and a bearing 54ª forming a continuation of the bearing 54, retracts the rod 12 to which the slide head 60 is attached, and moves it quickly in the direction of the arrow, Fig. 12. The return movement causes the trip lever to turn on its pivot, moving the armature 64 of the magnet 63 to its outer position and the end of the trip liver will be clear of the lug 57 so that it will pass the releasing mechanism without action until the magnet is energized by the paper tube coming in contact with the plate 9 of the tripping mechanism, which makes the contact, energizes the magnet, causing the mag-

net to draw in the armature and to turn the trip lever 58 on its pivot, when it will assume the position illustrated in Fig. 10 with its end in the path of the lug 57.

On the upper end of the trip lever is a bent arm 70 having a counter weight 71, which will properly balance the lever. On one end of the slide head are contacts 72 and 73, which come in contact with terminals 74 and 75 respectively mounted on the bearing 54 when the slide head is returned to its normal position, as illustrated in Fig. 3^b, so that when the tube strikes the plate 9 and causes it to make contact the magnet is energized and the trip lever is moved from the position shown in Fig. 12 to the position shown in Fig. 3^b, so that it will be in the path of a lug 57 on the chain 52, allowing it to be tripped so as to actuate the cut off tool and discharge the section of the tube.

The tripping mechanism is mounted on a bracket 75, projecting at the end of the machine, as clearly shown in Figs. 1 and 7. On this bracket is an undercut slideway 76 in which is mounted the base 77 of a slide head 78. Located between the two bearings 79 and 79^a on this head is the trip plate 9, in the present instance having a projection 9^a. On a bracket 89 are two terminals 81 and 81^a connected to the terminals 74 and 75 respectively. The projection 9^a is forced between these two contacts 81 and 81^a when the trip plate 9 falls by the end of the tube striking it.

It will be noticed that the trip plate 9, when raised, is beyond the line y, Fig. 7, and the tube, when it strikes it, pushes it past the center and it falls by its own weight, connecting the contacts and closing the electric circuit, which energizes the magnet 63 so that it will shift the trip lever 58 to the position illustrated in dotted lines Fig. 3^b. At one side of the plate 9 is a projection 9^b, which is arranged to come in contact with an adjustable stop 82 in the form of a screw, which is mounted in a bracket 78^a, projecting from the slide head, and which regulates the position of the plate. On the rod 43, Fig. 5, is a collar 83 in which is a post 84 and attached to this post is a tension spring 85 which is secured to a cord 86, extending to the trip mechanism and is attached to a pin 87 on the grooved wheel 88, which is mounted on the slide head 78. This wheel is mounted on the same pivot as the plate 9, in the present instance, and has an arm 89 provided with a weight 90. On the disk of the grooved wheel 88 is a pivoted pawl 91, which is arranged to engage the teeth of a ratchet wheel 92 located on the same spindle as the wheel 88. 93 is a spring which tends to yieldingly force the pawl into engagement with the teeth and 94 is a stop and release, which engages the pawl when it is returned to the position illustrated in Fig. 7 so as to force it out of engagement with the wheel 92, but as soon as the wheel 88 moves in the direction of the arrow, Fig. 7, the pawl moves out of the control of the stop 94 and its spring forces it into engagement with the teeth of the wheel 92. Secured to this wheel 92 is an arm 95 having a weight 96, which tends to hold the wheel in its normal position, as illustrated in Fig. 7, and on this wheel is a pin 97, which is in the path of the projection 9^b, so that when the wheel 92 is turned in the direction of its arrow 1 it will lift the plate, returning it to its normal position, as illustrated in Fig. 7.

The operation of the machine is as follows:

The formed tube is projected through the die 4 and onto the trough 7 and as it is fed forward it comes in contact with the plate 9, the parts being set as illustrated in Fig. 1. The moment the end of the tube strikes the plate 9 of the trip mechanism it pushes the plate over the center y, and the plate falls to the position shown in dotted lines, Fig. 7, connecting the terminals 81 and 81^a, and as these terminals are wired to the terminals 74 and 75, and as the spring contacts 72 and 73 of the magnet 63 are in contact with these terminals, the magnet will be energized and will retract the armature, shifting the trip lever 58 to a position in the path of the lug 57 on the chain 52 and as the chain is moving slightly in the direction of its arrow, the lug 57 will strike the trip lever 58 and will move the slide head and rod 12, including the blade 6 and its driving mechanism in the direction of the arrow, Fig. 1, compressing the spring 69 and releasing the grooved wheel 88, which is weighted so as to allow it to turn on its pivot. This movement releases the pawl 91 from the stop 94 so that it will engage the teeth of the ratchet wheel 92. The movement of the slide head is continued until the horn, or projection 66 comes in contact with the fixed roller 67, as shown in Fig. 11, which will tilt the block and withdraw the trip lever from engagement with the lug 57 on the chain. The moment this trip lever is released the spring 69, which has been compressed, returns the slide head carrying the block, trip lever, and the magnet, to their normal positions. This movement causes the wheel 88 to be returned to its normal position, as the wheel is connected to the post which is, in turn, connected to the slide head and as it is returned it will also turn the ratchet wheel 92 in the direction of the arrow 1, due to the fact that its pawl 91 is in engagement with the teeth of the ratchet wheel. As the pin 97 on the ratchet wheel is in the path of the projection 9^b of the plate 1, it will return the plate to its normal position in contact with the stop 82 and the pawl will be withdrawn

from the ratchet teeth by the stop 94, and the weight 96 of the ratchet wheel 92 will return the ratchet wheel to its normal position, as illustrated in Fig. 7. This action causes the movement of the bearing 40, which is connected to the side 33 of the trough, which is opened to allow the cut tube section to roll over the guides to one side of the machine. The trough is then closed and the above operation is repeated every time the tube is projected against the plate 9.

It will be seen by the above operation that this electric cut off and discharge mechanism is entirely automatic and is actuated by the tube.

I claim—

1. The combination in a tube cutting machine, of means for feeding the tube; means for supporting the tube; an endless chain; a lug on the said chain; a cutter carrier; means connected to the cutter carrier including a lever arranged to be moved into the path of the lug on the chain; a cam for causing the cutter to move across the path of the tube when the cutter carrier is under the control of the chain; a tripper actuated by the tube; means controlling the movement of the lever; connecting mechanism whereby when the tripper is struck by the tube the lever will be set in the path of the lug on the chain and the cutter will be moved longitudinally with the tube and will sever the tube while traveling; and means for returning the cutter and the mechanism carrying the lever to the original position.

2. The combination in means for cutting off tubes, of a guide; a cutter; a trough for receiving the tube as it passes through the guide; a trip plate against which the end of the tube comes in contact; electric mechanism controlled by the plate; a trip lever; a traveling lug arranged to engage the lever; actuating means for the cutter; a slide head on which the trip lever is mounted and arranged to actuate the cutter, the parts being so arranged that when the tube strikes the plate the trip lever will be moved in position to be engaged by the traveling lug which will move with it so as to actuate and to return the parts of the tripping mechanism to the original position.

3. The combination in a tube cutting off machine, of a guide for the tube; a trough in which the tube rests; trip mechanism at the end of the trough and which is tripped by the tube; a cut off device actuated by the trip mechanism; and means for opening the trough, also actuated by the trip mechanism, so as to discharge the cut off section of the tube from the machine.

4. The combination in a tube cutting off machine, of a guide for the tube; a trough in which the tube rests; trip mechanism at the end of the trough and which is tripped by the tube; a cut off device actuated by the trip mechanism; means for opening the trough, also actuated by the trip mechanism, so as to discharge the cut off section of the tube from the machine; and means for returning the trip mechanism in position to be again actuated as another length of tube is projected.

5. The combination in a machine for cutting off tubes, of a guide through which the tube passes; a cutting device at the guide; means for moving the cutting device across the tube to be cut off; a trough for receiving the tube section to be cut; tripping mechanism at the end of the tube; a traveling lug; means for driving the lug; a trip lever; means carrying the trip lever and the cutter so that when the trip lever is engaged by the lug, it will be moved forward, carrying with it the cutting device, which will travel at the same speed as the tube; and means for moving the cutter across the tube so that while the cutter is traveling longitudinally it will sever the tube.

6. The combination in a tube cutting off machine, of a guide for the tube; a cutter for cutting off the tube at the guide; tripping mechanism; a slide head; a spring tending to retract the slide head; an endless chain, means for driving the chain; a lug on the chain arranged to engage the slide head; means for releasing the slide head from engagement with the lug on the chain, the cutter being connected to the slide head so as to move with it, so that when the slide head is released, the spring will retract both the slide head and the cutter.

7. The combination in a machine for cutting off tubes, of a guide for the tube; means for receiving the tube; a trip mechanism actuated by the tube; a cutter; a rod carrying the cutter; a slide head on the rod; a trip lever pivotally mounted on the slide head; an endless chain; means for driving the chain; a lug on the chain engaging the trip lever; means for rotating the cutter; a fixed cam for moving the cutter across the path of the tube when the rod is moved longitudinally; and a spring for returning the parts to their normal positions.

8. The combination of means for feeding a tube; a guide through which the tube is fed; a trough for receiving the tube; a tripping device actuated by the tube to release the cutting mechanism; a cutter; a rod on which the cutter is mounted; means for rotating the cutter; a cam for turning the cutter on the rod to sever the tube; a slide head on the rod; a block pivotally mounted on the slide head; a trip lever mounted on the block; means for returning the trip lever to its normal position; an endless chain; means for driving the chain; and a lug on the chain arranged to engage the trip lever when projected so as to cause the slide

and its rod and the cutter to move; and a spring for retracting the rod and to return the parts to their normal positions.

9. The combination in means for cutting off tubes, of a guide for the tube; a rod; a fixed frame; a cam pivoted to the frame; a cutter carrier; a cutter thereon; means for rotating the cutter; an arm on the cutter carrier arranged to travel on the cam; trip mechanism actuated by the tube and an endless chain having a lug thereon; a slide head on the rod carrying the cutter; a trip lever on the slide head arranged to be engaged by the lug on the chain; means for releasing the trip lever from the lug after the slide head is moved a given distance; and means for returning the trip lever to its normal position; and a spring for retracting the rod, the slide head and the cutter.

10. The combination in a machine for cutting off tubes, of a guide through which the tube extends; a trough beyond the guide for receiving the tube; trip mechanism actuated by the tube; a cutting off device for cutting the tube at the guide; a rod on which the cutting off device is mounted; a slide head on the rod; a trip lever carried by the slide head; traveling means arranged to engage the trip lever; a spring for retracting the slide head and rod when the trip lever is released; means for moving the cutter so as to sever the tube; and means actuated by the slide head for opening the trough and allowing the cut tube section to be discharged.

11. The combination in a tube cutting machine, of a guide through which the tube is projected; a cutter at the guide having both a longitudinal and a transverse movement; a trough to receive the tube; a tripper at the end of the trough against which the end of the tube comes in contact; a rod carrying the cutter; a slide head mounted on the rod; a block pivoted to the slide head; a trip lever pivoted to the block; a driven device for engaging the trip lever and for moving the rod forward with the tube; a spring for retracting the rod, cutter and slide head; and means for returning the trip lever and the tripping mechanism to the normal position.

12. The combination in a machine for cutting a tube, of a guide through which the tube extends; a cutter for severing the tube and located near the guide; a trough to receive the tube; a trip plate against which the end of the tube comes in contact; a projection on the trip lever and electric terminals with which the projection engages when the trip lever is moved by the tube; a slide head connected to the cutter; a magnet on the slide head; an armature; a trip lever connected to the armature; terminals on the slide head and fixed terminals on the frame with which the terminals on the slide head come in contact; means for moving the head forward; and means for retracting the head so as to cause the terminals on the head to make contact with the fixed terminals, the terminals on the frame being connected to the terminals at the tripping mechanism.

13. The combination in a machine for cutting tubes, of means for projecting the tube; a device for cutting off the tube; a trip plate against which the end of the tube comes in contact, said trip plate being pivoted and having a projection fixed terminals with which the projection on the plate comes in contact when the plate is moved by the tube; a device for carrying the cutting off mechanism, said device having a trip lever and a solenoid magnet for returning the trip lever to its actuating position when the electric circuit is closed by the tripping mechanism; a wheel; a cord attaching the cutting off device with the wheel, said wheel having a weight; a pawl on the wheel; a ratchet wheel with which the pawl engages; a weight on the ratchet wheel; an arm on the ratchet wheel for engaging the trip plate and returning it to its normal position after the cutter has severed the tube.

14. The combination in a tube cutting machine, of a guide; through which the tube extends; a cutter at the guide; means for rotating the cutter; and a device for moving the cutter across the path of the tube; a slide head with which the cutter is connected; a trip lever carried by the slide head; an endless chain, a lug on the chain arranged to engage the trip mechanism; a magnet on the slide head; electric terminals on the slide head connected to the magnet; fixed terminals on the frame with which the terminals on the slide head come in contact; a trip lever in the path of the tube; fixed terminals which are connected when the plate drops; a weighted wheel; means connecting the slide head with the said wheel so that the wheel is released when the lug on the chain actuates the slide head; a pawl on the wheel; a ratchet wheel with which the pawl engages; a weight on said ratchet wheel; a spring for returning the slide head to its normal position when released from the lug on the chain the weighted wheel being at the same time rotated, carrying with it the ratchet wheel; and a pin on the ratchet wheel engaging the trip plate so that the plate is returned to its normal position on the return movement of the slide head.

In witness whereof I affix my signature.

OTTO H. ROESSLING.