Nov. 17, 1953

M. S. MANSSON

TAPE CUTTING MACHINE

2,659,435

Filed April 22, 1948

4 Sheets-Sheet 1

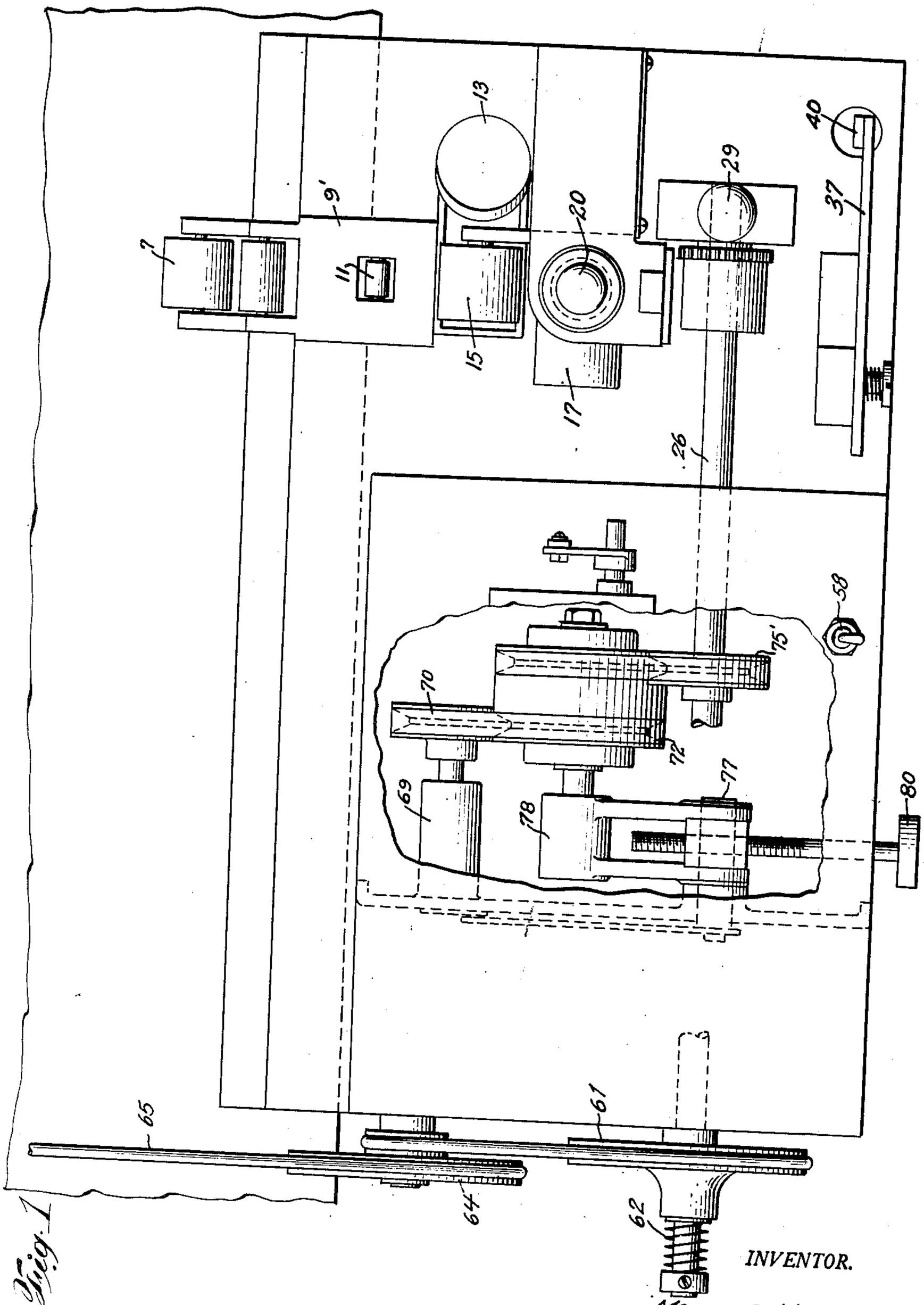

Fig. 1

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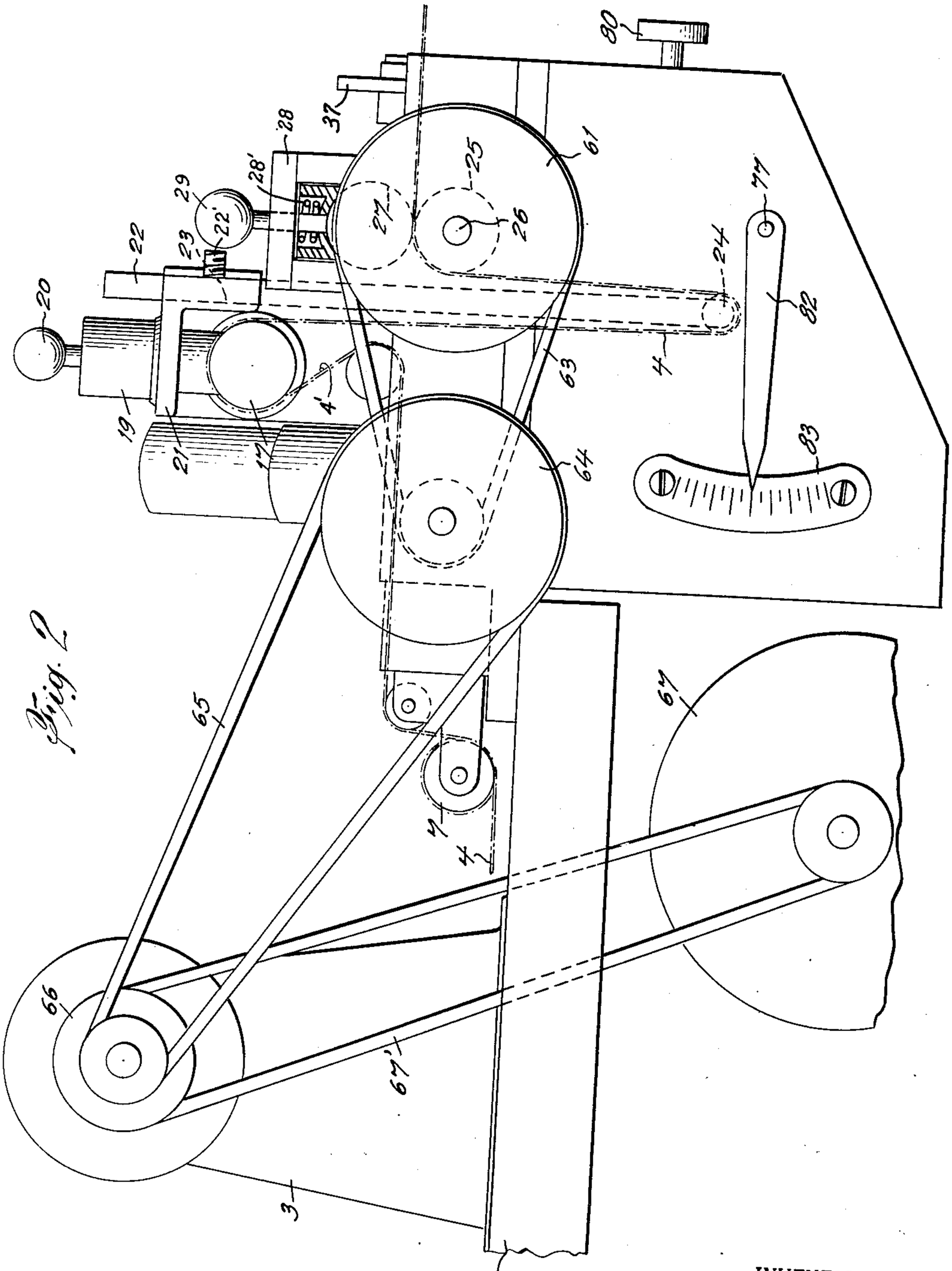

Fig. 2

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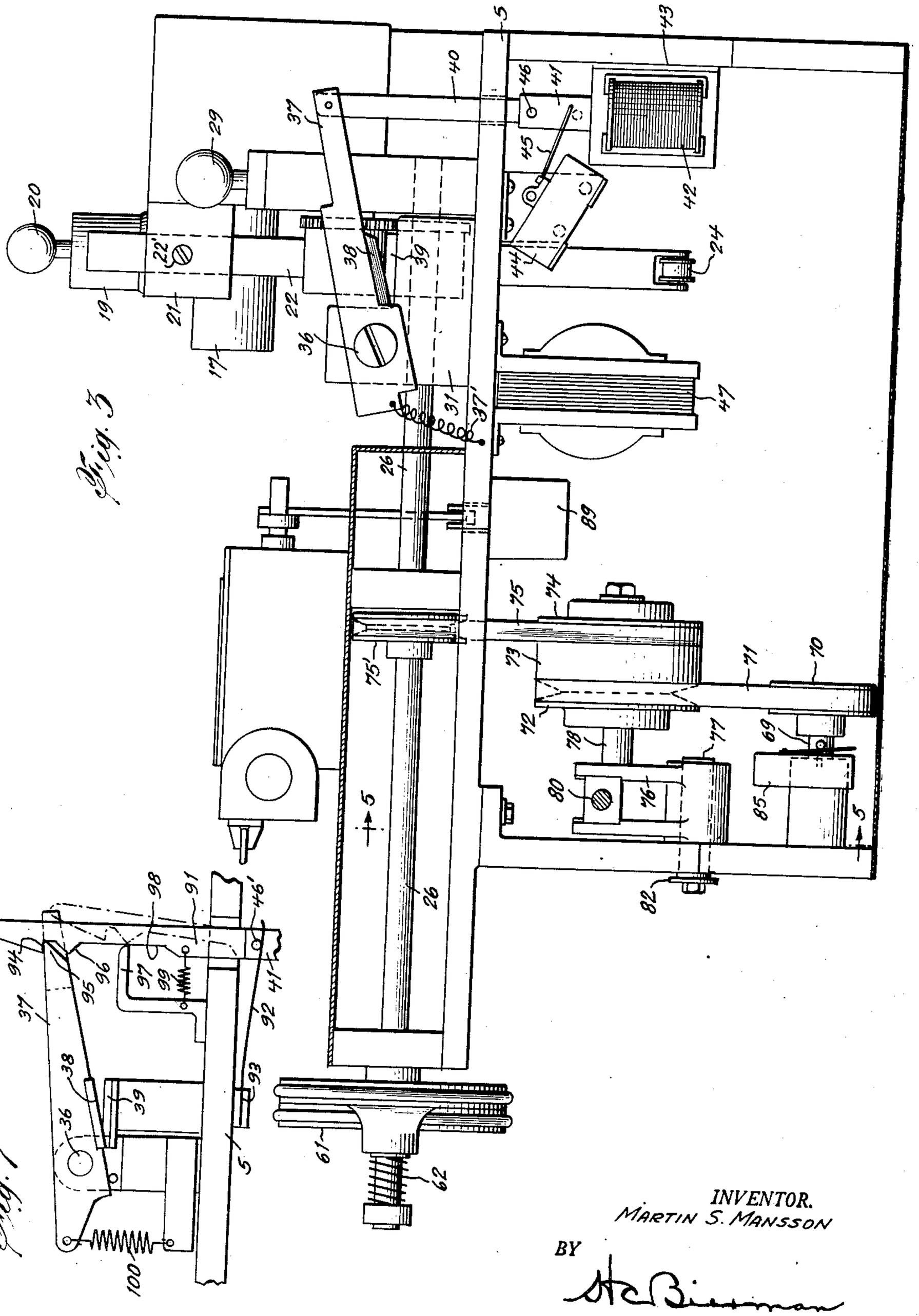

Fig. 3

Fig. 4

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Fig. 4

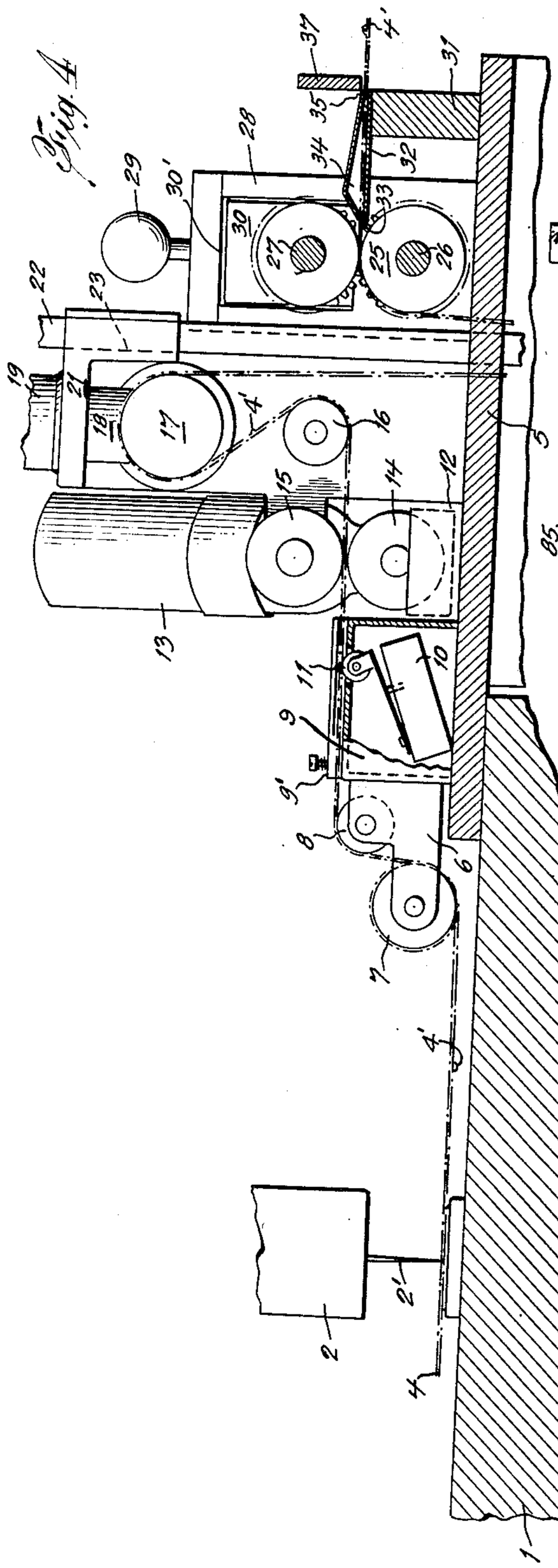

Fig. 6

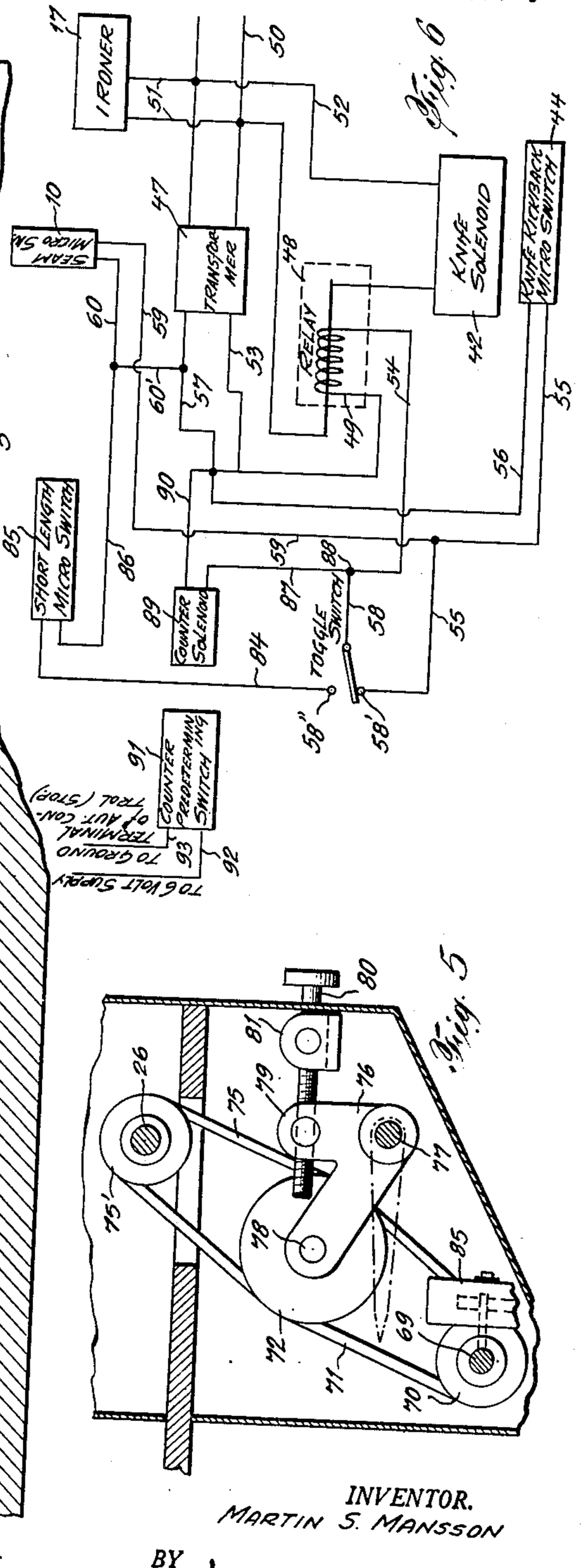

Fig. 5

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UNITED STATES PATENT OFFICE

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TAPE CUTTING MACHINE

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Application April 22, 1948, Serial No. 22,562

2 Claims. (Cl. 164—42)

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The present invention is directed to cutting machines, more particularly to an apparatus for cutting tape which is fed more or less continuously and which in many cases has been sewed in a suitable sewing machine cooperating with said cutting apparatus.

In the garment industry, it is often desirable to provide a tape for sewing into various garments, to perform various functions. In some cases relatively short pieces of tape are sewed together, end to end, and then stitched longitudinally in a sewing machine in order to finish the same. In other cases, a roll of tape, usually having a selvage is provided. In such cases, it has been necessary to individually measure each length of tape to be cut, and the cutting was done either by hand scissors or mechanically operated knives or scissors. Such a procedure had a number of disadvantages in that it was not possible to quickly and accurately cut pieces of tape by hand as variations in measured lengths often occurred. Also, it required considerable hand labor in order to accomplish such a result.

The present invention is intended and adapted to overcome the difficulties and disadvantages inherent in prior devices of the kind described, it being among the objects thereof to provide a substantially automatic apparatus or machine, which will cut tape or the like quickly, effectively and economically.

It is also among the objects of the present invention to provide a cutting apparatus which is readily adjustable so as to vary and adjust the length of tape to be cut.

It is further among the objects of the present invention to provide a device which does not require a skilled operator to use, which is simple and sturdy in construction, and which is readily adaptable to cooperate with a sewing machine or to operate independently thereof.

In practicing the present invention, there is provided a series of rolls or the like, capable of drawing tape or other narrow fabric through the apparatus and into the path of a knife. A sensitive switch, such as a microswitch, is provided and the knife is connected into an electrical circuit by means of a solenoid cooperating therewith, the circuit containing said switch. At predetermined intervals, such as when a transverse seam on the tape touches the switch, the circuit is operated so as to cause the knife to cut the tape. There is provided a device through which the tape passes on its way to the knife, which may be adjusted so that the length of the tape being cut may be similarly adjusted. Other elements and additional circuits are provided so that tape not having any cross seams may be accurately cut, and a different measuring device is provided. The device as a whole is capable of measuring and cutting extremely short lengths as well as relatively long lengths of tape.

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In the accompanying drawing constituting a part hereof, and in which like reference characters indicate like parts,

Fig. 1 is a top plan view of a cutting machine or apparatus made in accordance with the present invention, some parts being broken away for clearness;

Fig. 2 is an end elevational view thereof looking from the left of Fig. 1;

Fig. 3 is an end elevational view thereof, looking towards the sewing machine, some parts being omitted and other parts being shown in section;

Fig. 4 is a side elevational view thereof, some parts being broken away for clearness;

Fig. 5 is a vertical cross-sectional fragmentary view taken along the line 5—5 of Fig. 3,

Fig. 6 is a diagrammatic view showing the electrical circuits incorporated in the device, and

Fig. 7 shows a modified mounting of the cutting knife.

There may be provided a sewing machine shown diagrammatically as having a bed 1, a head 2, with sewing instrumentalities, including a needle 2' therein. The head may be formed on the end of the usual sewing arm which is part of the base 3 of the machine. Tape 4, which may be shoulder straps for ladies' garments, are passed through the sewing machine, as shown in Fig. 4, to be suitably stitched.

The device of the present invention may consist of a support 5 suitably located with respect to the sewing machine. At the end of the support adjacent to the sewing head on a bracket 6 are a pair of wheels 7 and 8, the tape 4 passing around wheel 7 to allow inspection of the tape, and over wheel 8. The tape then passes over casing 9 having a microswitch 10 therein. A wheel 11 is mounted on the end of the switch lever and extends slightly above the upper face of casing 9 in position to be contacted and depressed by a seam of tape 4 as it passes over wheel 11. A spring held cover 9' confines the tape to insure contact thereof with wheel 11.

Adjacent to said casing and to the right thereof, as shown in Fig. 4, is a moistening device consisting of a container 12 for water and a source 13 to maintain a substantially constant adjustable level in container 12. Horizontally mounted

rolls 14 and 15 are positioned so that tape 4 passes between the same. Roll 14 takes up water and moistens the tape. The latter then passes around roll 16 and over cylindrical arm 17 which constitutes an ironer. It contains a suitable electrical resistance element to maintain desired temperatures. A presser 18 mounted in casing 19 having a coil spring therein exerting pressure on said presser tends to keep the same in position to iron the tape. Handle 20 on the end of presser 18 allows the same to be manually lifted.

Said ironing mechanism is mounted on one arm of a bracket 21 which is fixed to support 5. An adjustable measuring bar 22 extends vertically through slot 23 in bracket 21. The lower end 24 of bar 22 is provided with a roller and tape 4 is adapted to pass under the same. Means, not shown, are provided for fixing bar 22 in its bracket, said means allowing adjustment of the vertical position thereof. One may use for this purpose a set screw type of device passing through bracket 21 and bearing against bar 22.

A horizontal shaft 26 which constitutes the driving member has a feed roller 25 secured thereto, tape 4 passing over said roller. A second roller carried by shaft 27 mounted in yoke 28, fixed on support 5, is intended to press against roller 25 and is geared thereto. This is accomplished by a spring loaded bearing support in yoke 28, against which a coil spring 28' mounted in said yoke presses. Handle 29 allows the retraction of bearing 30.

The tape after being drawn through rollers 25—27 then enters guide 32. It consists of a flat base on which the tape lies and is substantially enclosed but with a slot 33 at the entrance end thereof. A chamber 34 is provided therein, said chamber being higher at the entrance end and sloping down to slot 35 at the exit end thereof. Guide 32 may be mounted on plate 31 secured to support 5.

On said plate is a stub shaft 36 carrying arm 37 so as to oscillate on said shaft. Said arm carries a hardened knife blade 38 adapted to cooperate with a similar knife blade 39 fixed on plate 31. The cooperating blades may be given an automatically retroactive action by suitable spring 37' or other arrangements, as is well known. Depending from the end of arm 37 is rod 40 carrying an armature 41 at the lower end thereof. Said armature operates within solenoid 42 attached to the support at 43.

A microswitch 44 having an operating arm 45 is secured in proximity to armature 41 so that arm 45 is almost in contact therewith. Microswitch 44 may be termed a "kick-back switch" for purposes to be later described. Pin 46 at the top of armature 41 is so located with respect to arm 45 that when arm 37 is in its lowest position, pin 46 depresses arm 45 and opens the switch which is otherwise normally closed.

With reference to Fig. 4, tape 4 having a series of transverse seams 4' therein passes to the right around wheel 7 and over wheel 8 and in contact with roll 11, then through moistener 14—15 and between ironing elements 17—18, one or both of which is electrically heated, whereby the tape is ironed. It then passes under roller 24 and upwardly between rollers 25 and 27, being drawn through the foregoing elements by the positive action of rollers 25 and 27. It then passes through guide 32 in position for knife 38 to cut the same, as shown in Fig. 1. When a seam in the tape contacts roll 11, it depresses the same and closes the circuit of microswitch 10. The

action which takes place is illustrated by the wiring diagram of Fig. 6. There is provided a transformer 47 and a relay 48 having a coil 49 therein. Power at the usual voltage enters the transformer by line 50. Ironer 17 is directly supplied with current through line 51, there being the usual switch in the line. Knife solenoid 42 is supplied with the high voltage current through line 52. From the low voltage side of the transformer, which may conveniently be six volts, a lead 53 connects with coil 49, the other end of which has a lead 54 connected to toggle switch 58. Assuming that the switch is in the position shown, current flows through terminal 58', wire 55, to kick-back switch 44, then through wire 56—57 to the other terminal of the secondary transformer. A parallel circuit leading from wire 55 extends through wire 59 to the seam microswitch 10, then by wires 60 back to the transformer.

In operation, when a seam closes microswitch 10, current flows from the secondary of the transformer through the relay, closing the same and energizing solenoid 42. This immediately pulls arm 37 down, causing knife blades 38—39 to cut off a piece of tape 4'. When pin 46 strikes arm 45, switch 44 is opened, breaking the circuit of microswitch 10 and allowing the knife to be retracted by a spring 37' into its initial inoperative position. If, however, the seam has not passed roll 11 and still continues to maintain switch 10 closed, the circuit will be immediately reestablished before arm 37 has an opportunity of being retracted due to the inertia of the mass involved. Therefore, as long as the seam is in contact with roll 11, the knife will flutter back and forth and after the seam has passed over roll 11, the knife will be retracted.

Because of the character of guide 32 in case the knife is held down for a substantial fraction of time, tape will be continued to be fed by the action of roller 25 and a certain amount thereof will accumulate between roller 25 and knife 38. Because of the shape of the chamber 34, such accumulation will be permitted and after the knife has been retracted, the shape of the chamber is such that the accumulation will be forced out of slot 35, thus at the time of the next operation of the knife, the exact predetermined amount of tape will have been fed so that identical lengths will be cut off under all conditions.

The outer end of shaft 26 as shown in Figs. 2 and 3 is provided with a slipping clutch pulley 61, spring pressed as shown at 62. This in turn is connected by belt 63 to pulley 64, which in turn is connected by belt 65 to pulley 66 secured onto the main shaft of the sewing machine. Motor 67 drives said main shaft through belt 67'.

When it is desired, in a modification, to cut lengths of tape from a continuous roll or a long strip, and not having any transverse seams therein, the following mechanism is used for measuring the lengths to be cut. Shaft 69 has pulley 70 thereon and belt 71 therefrom passes over pulley 72. Said pulley is associated with an idler pulley 73 (see Fig. 3) and an additional pulley 74 on the opposite side thereof. A belt 75 passes over pulley 74 and pulley 75' mounted on shaft 26. A series of cone pulleys 72, 73, 74 is mounted on stub shaft 78 carried by yoke 76, which is pivoted at 77 to the base of the machine. On arm 79 of yoke 76 is a screw 80 mounted in holder 81. The adjustment of the length of tape to be cut is determined by the ratio of speeds of pulleys 75' and 70. The ratio is altered by threading screw 80 in one direction or the other, thus pivotally moving pulley

73 about shaft 77 as a center. This changes the tensions in belts 71 and 75 and alters the speed ratio by shifting idler 73 laterally relative to pulleys 72 and 74 so that belts 71 and 74 are caused to adjust themselves in the grooves of said pulleys.

Toggle switch 58, which is a manually operated throw switch, is placed in a position to close the circuit through terminal 53. Current from the transformer passes through said switch, line 84, to microswitch 85, then by wire 86 through wire 60′ back to the transformer. Another circuit is provided from point 88 through a counter-solenoid 89 for actuating the counter, wires 90 and 57, back to the transformer. There is also provided a counter predetermining switch 91 for automatically stopping the operation, which is connected by wire 92 to the low voltage supply and wire 93 leads to ground.

Means are provided so that during the rotation of the speed adjusting pulleys a pin or other element, shown at the lower left of Fig. 3, on the shaft 69 of the pulley 70 closes microswitch 85 at each rotation and thus closes the circuit of the knife solenoid 42, causing the same to operate. Since the speed of such a pulley is altered by screw 80 to the desired point, the cut-off is of a predetermined length. An indicator is usually provided to visually show the lengths being cut. This includes a pointer 82 fixed on shaft 77 and cooperating with calibrated scale 83 on a side of support 5. As yoke 76 is rotated, shaft 77 rotates with it and thus moves pointer 82. This arrangement may be used to cut any desired length of tape, from quite short lengths of a few inches to several feet, by changing the size of the pulleys to increase or decrease the speed ratio. In this operation switch 10 is not in the circuit.

In this modification microswitch 10 is omitted. Toggle switch 58 (see Fig. 6) is shifted to omit the circuit of switch 10 when switch 85 is used.

In Fig. 7 is shown a modified form of knife operating mechanism. At the upper end of armature 41 is a lever 91 having a pair of springs 92, the free ends of which contact the underside of pin 46 which extends through armature 41, on opposite sides of said armature. Said springs are anchored at 93 on support 5 and bias lever 91 upwardly. A notch 94 in the upper end of lever 91 received finger 95 on the end of arm 37. Below said notch is a cam face 96 which cooperates with a cam follower mounted on said support and normally contacting the face 98 of said lever. A spring 99 urges the lever into cooperative relation with finger 95 and follower 97. Spring 100 tends to retract arm 37 and hold it in its upper position.

In the operation thereof, when solenoid 42 is energized it pulls lever 91 down against the action of springs 92 and 100. Notch 94 contacting finger 95 pulls arm 37 down causing knife blades 38—39 to cut the tape. Face 98 moves past follower 97 which then rides on cam 96 pivoting lever 91 about pin 46′ passing through armature 41, to the right against spring 99; this moves notch 94 out of contact with finger 95, resulting in the freeing of arm 37 and allowing spring 100 to retract it into the initial position shown in Fig. 7. As long as the circuit of solenoid 42 is closed, lever 91 remains in its lower position and the knife cannot again operate until the lever is first released by the solenoid 42. This prevents accidental cuttings of the tape

where seams therein are relatively long. When solenoid 42 is deenergized, armature 41 moves upwardly by pressure of spring 92 carrying lever 91 upwardly until notch 94 and cam face 96 are above arm 37 and cam 97, respectively, when spring 99 pulls lever 91 to the left into operative position.

Other modifications of the invention may be made within the spirit thereof, and the invention is to be broadly construed and to be limited only by the character of the claims appended hereto.

I claim:

1. A machine for cutting tape and the like comprising means for feeding tape including a driven roller over which said tape passes, a sensitive switch adapted to be operated by contact with a protuberance on said tape, a knife movable across the path of said tape, means actuated by a circuit controlled by said switch to move said knife to cut said tape at predetermined intervals, said knife being mounted on a pivoted arm, an armature actuated by a solenoid and operatively connected to said arm including a lever secured to said armature notches on said lever, a finger on said arm and means to alternately cause said notches to engage and release said finger for operation of said knife.

2. A machine for cutting tape and the like comprising means for feeding tape including a driven roller over which said tape passes, a sensitive switch adapted to be operated by contact with a protuberance on said tape, a knife movable across the path of said tape, means actuated by a circuit controlled by said switch to move said knife to cut said tape at predetermined intervals, said knife being mounted on a pivoted arm, an armature actuated by a solenoid and operatively connected to said arm including a lever secured to said armature and a finger-notch arrangement on said lever and arm, a cam on said lever, a follower for said cam, whereby at the lower portion of movement of said lever said notch and finger are detached to release said arm and knife.

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