

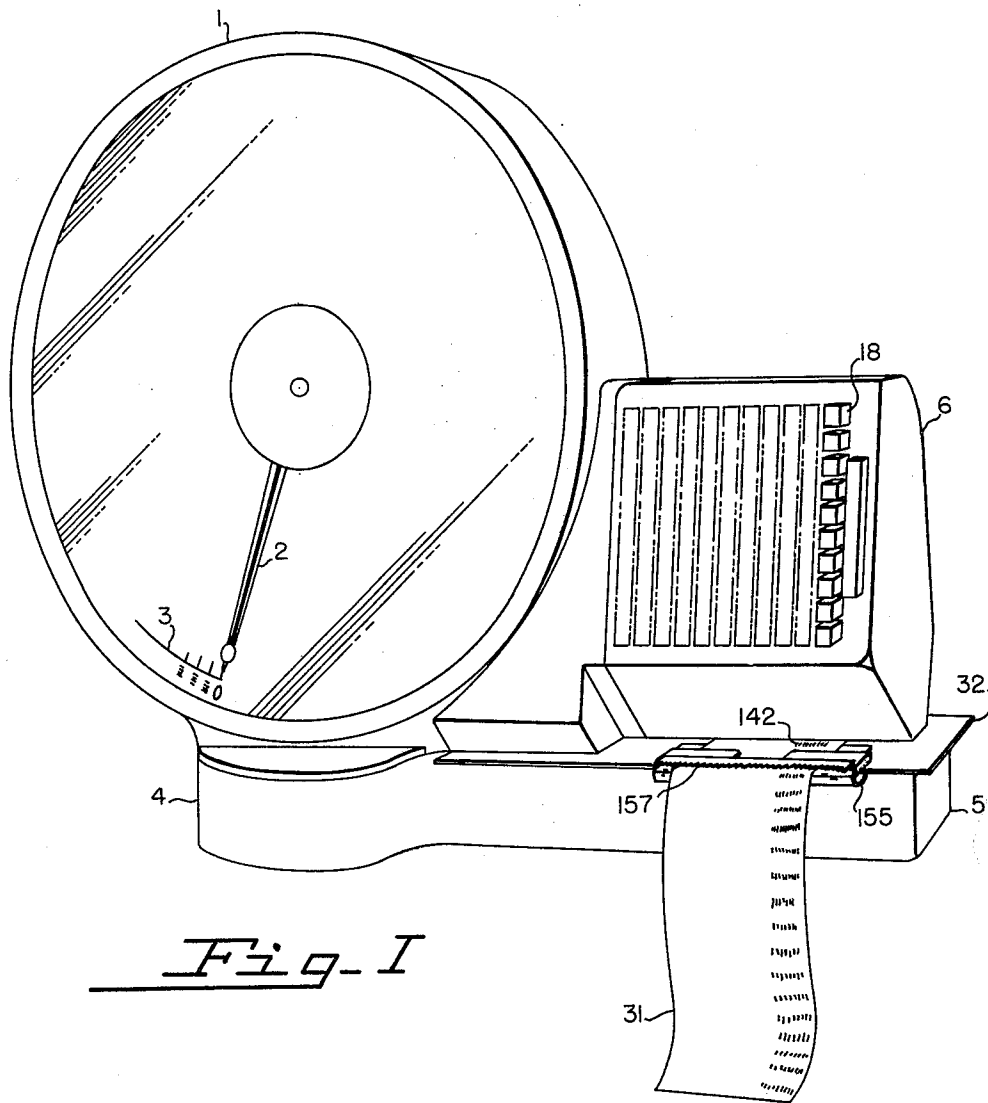
June 11, 1963

C. E. ADLER
PRINTER

3,093,066

Filed Oct. 9, 1959

7 Sheets-Sheet 1



INVENTOR.
CLARENCE E. ADLER

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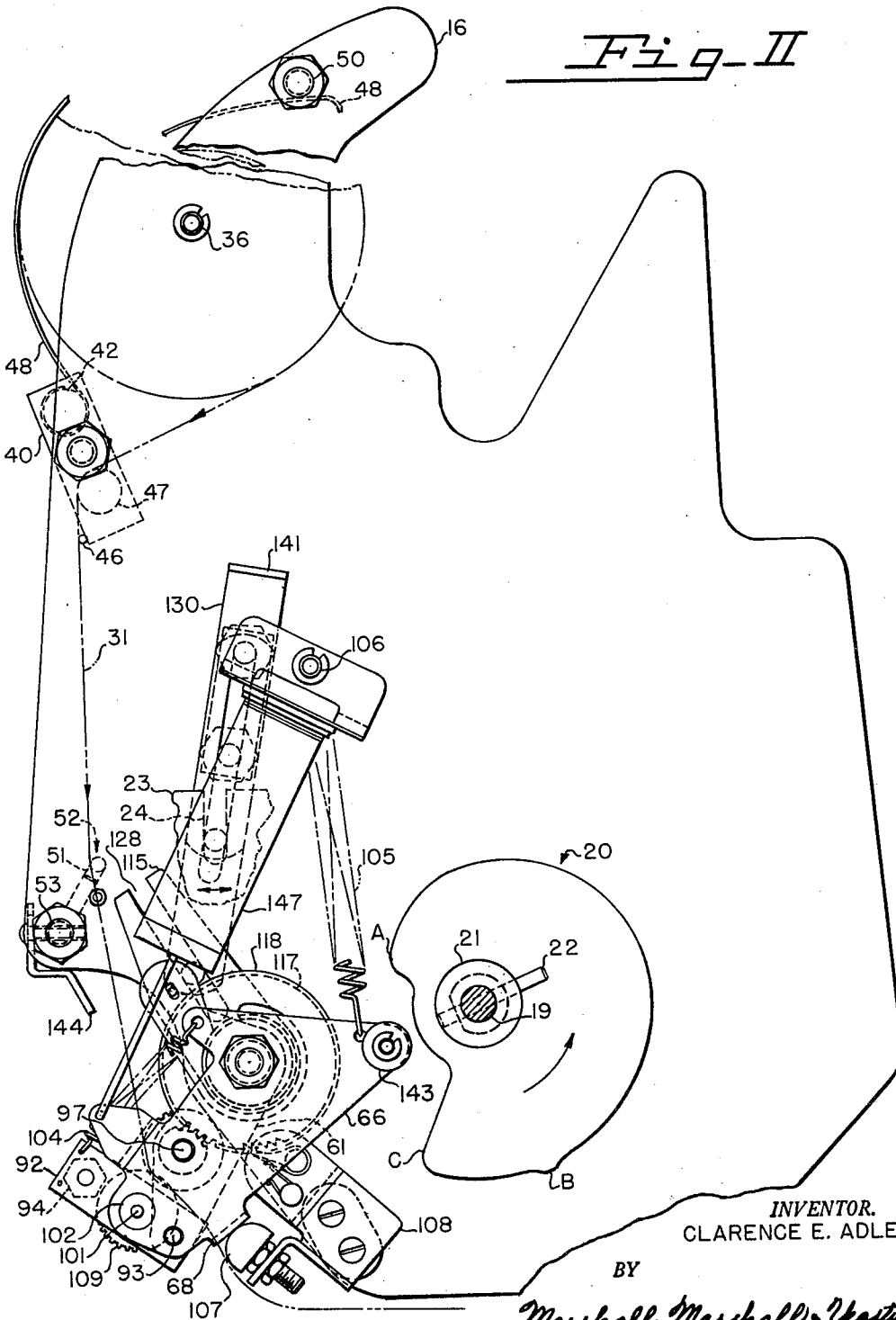
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3,093,066

PRINTER

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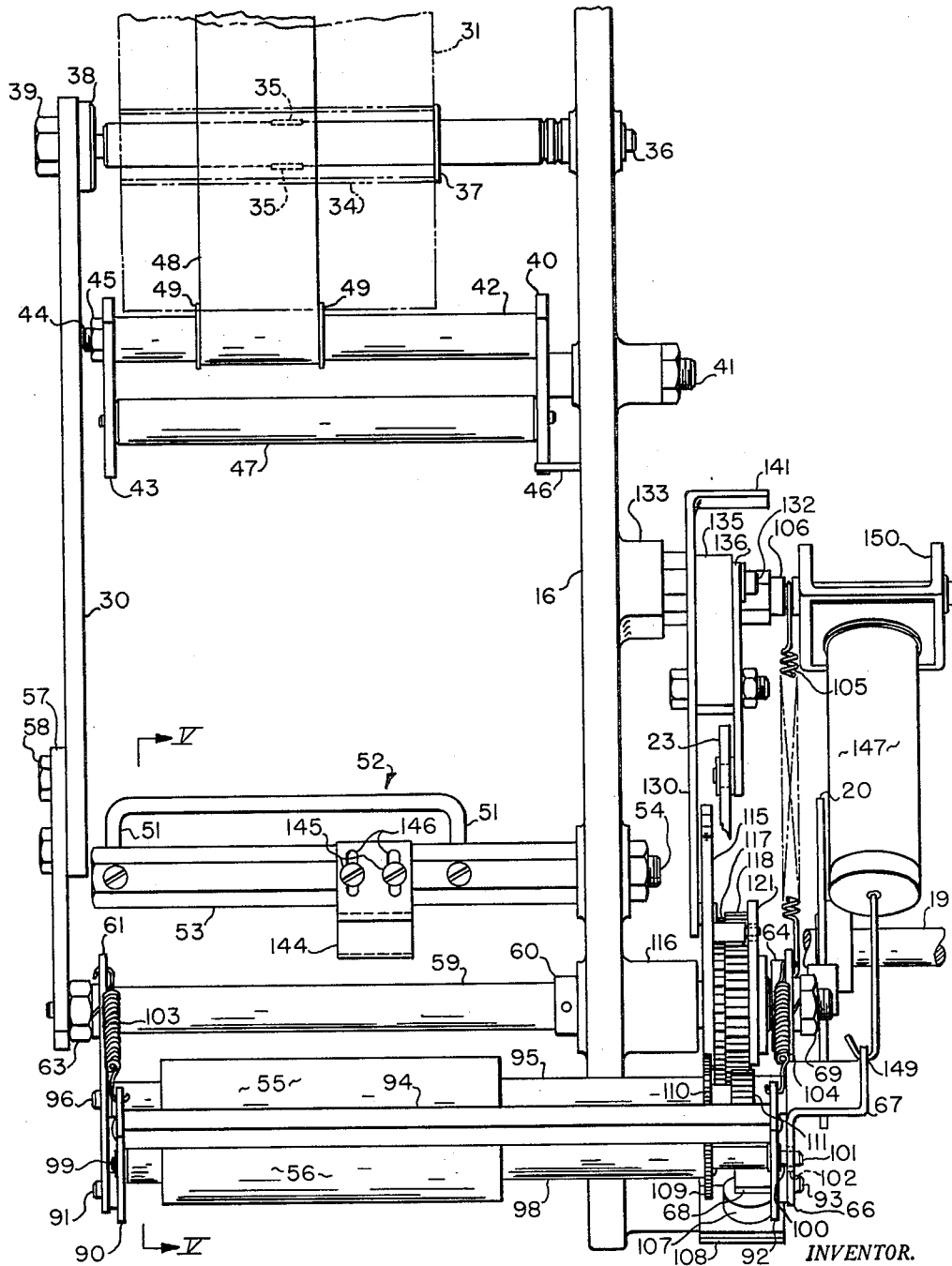


Fig. III

BY

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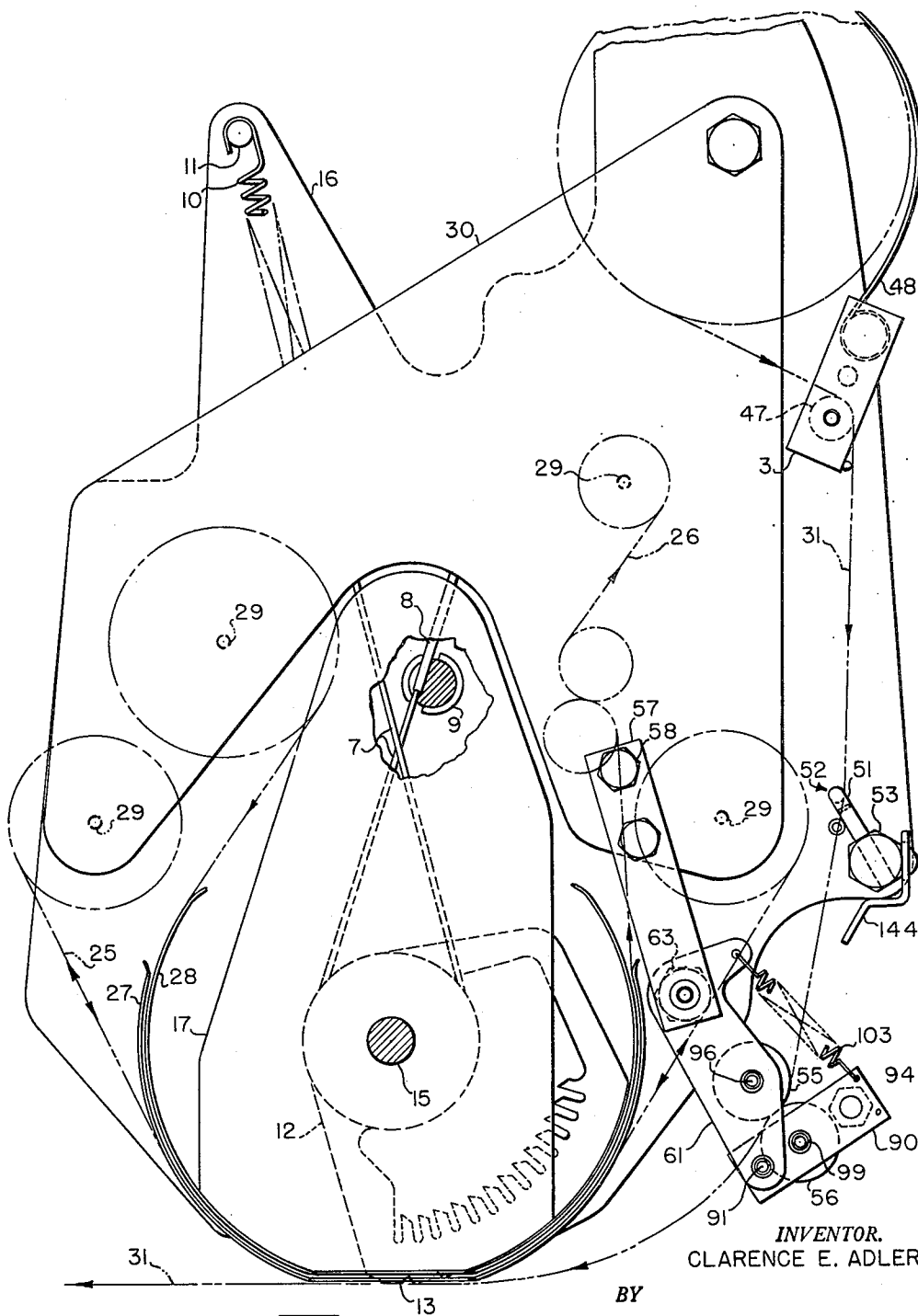


Fig. IV

BY
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June 11, 1963

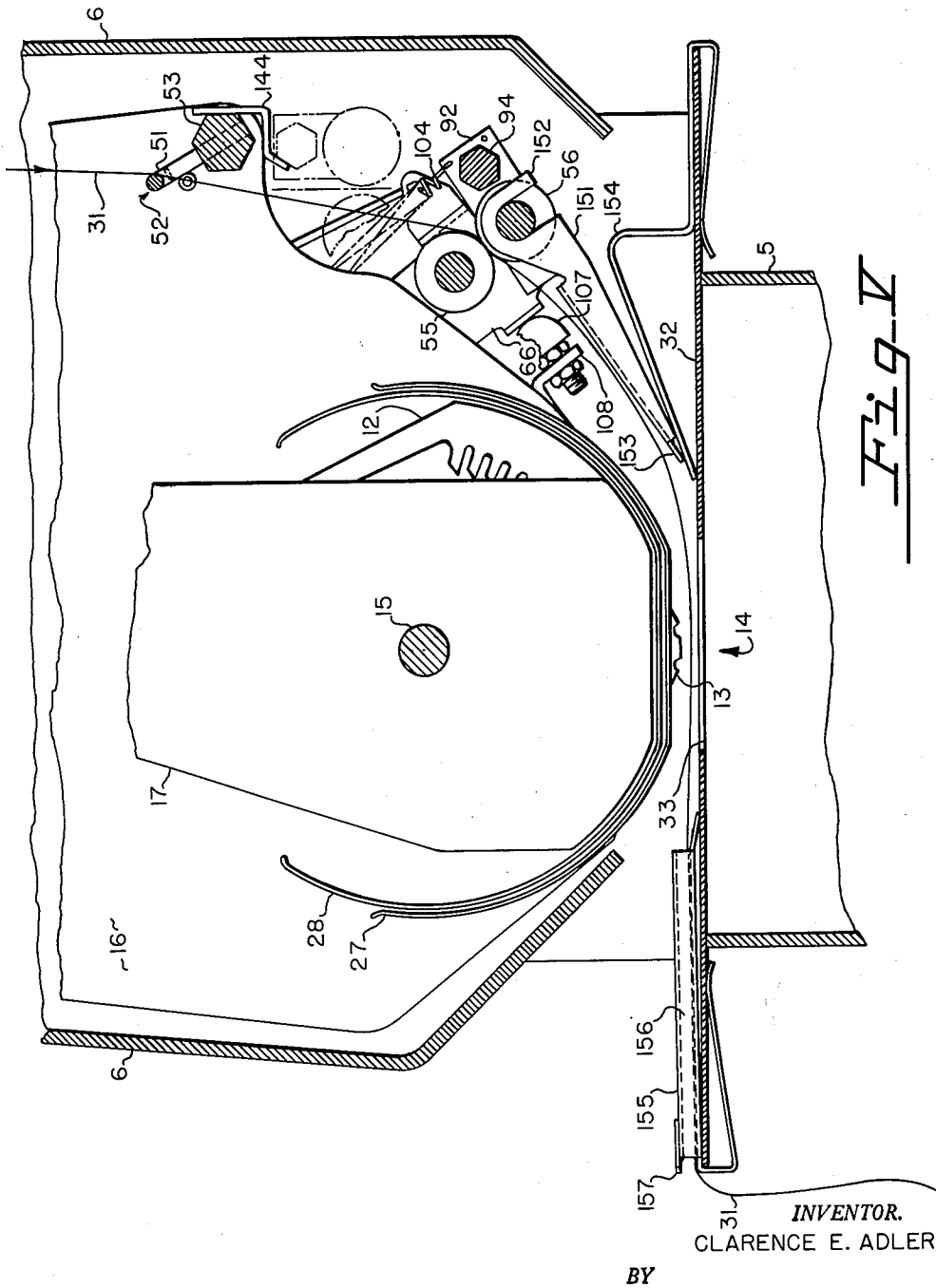
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3,093,066

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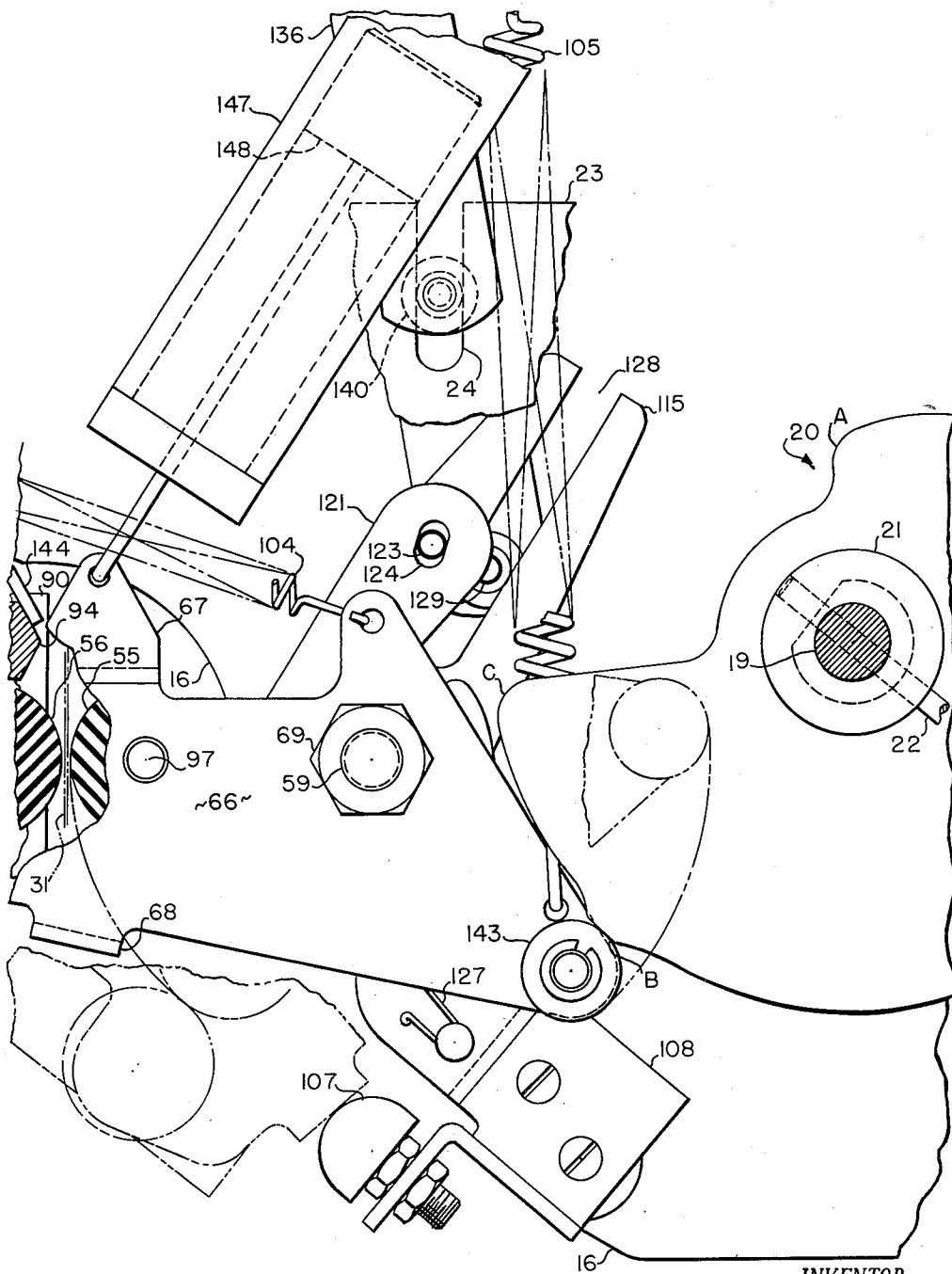


Fig. VI

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3,093,066

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7 Sheets-Sheet 7

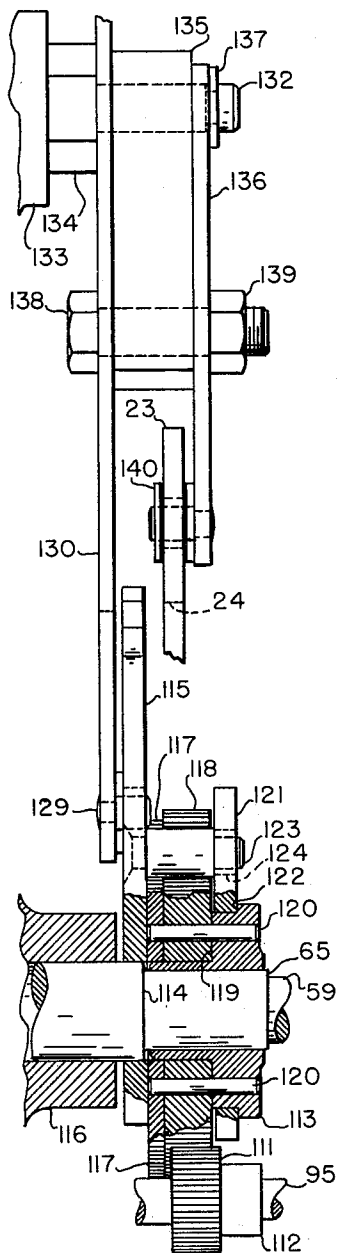


Fig. VII

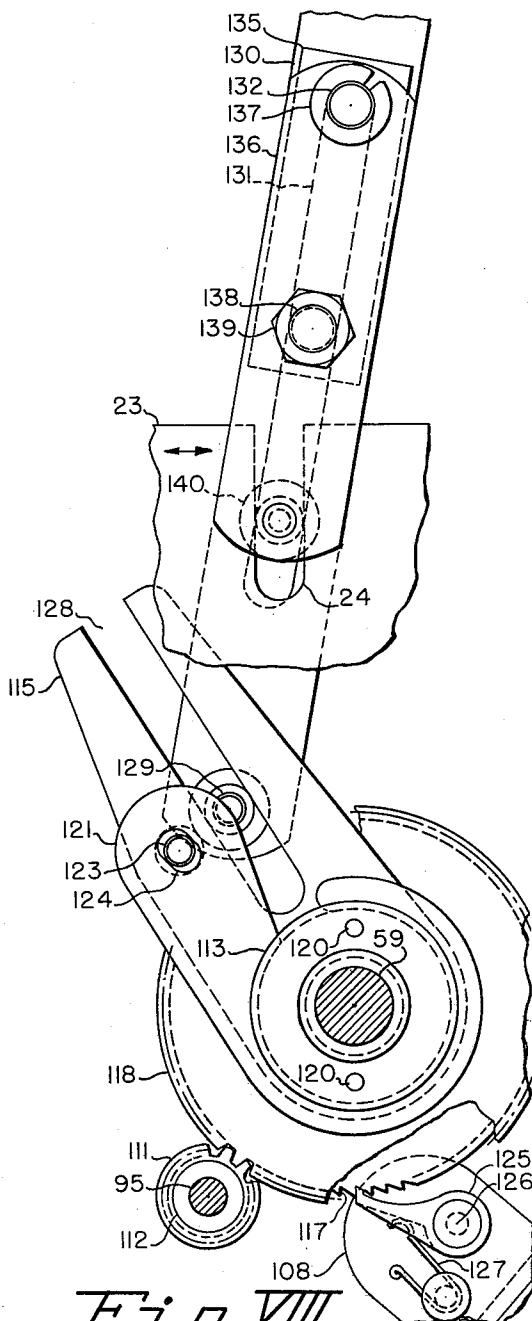


Fig. VIII

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3,093,066
PRINTER

Clarence E. Adler, Toledo, Ohio, assignor to Toledo Scale Corporation, Toledo, Ohio, a corporation of Ohio
Filed Oct. 9, 1959, Ser. No. 845,401
15 Claims. (Cl. 101—92)

This invention relates to a printing device.

The printing device is of simple and low cost construction, yet is rugged, reliable and accurate, and is particularly well suited for use in industrial installations. It is especially useful in industrial installations in conjunction with a weighing scale for printing weight indications in digital form.

Many industrial installations of weighing scales require that the printed matter be printed in successive lines on record strips which are separated from time to time from supply rolls mounted in the interiors of the printers. These record strips correspond to the tickets which are used in many industrial printers. The use of such a record strip in lieu of tickets creates several problems. For one thing, the last line of printed matter in the successive lines is located after being printed in the interior of the printer where it is not visible. For another thing, it often is necessary or at least desirable to vary the spacing of the successive lines of printed matter. Also, it is necessary that the record strip does not deviate from a predetermined path through the printer.

It is, accordingly, the principal object of this invention to provide a printer having a record strip on which successive lines of matter are printed with means for indicating the last print exteriorly of the printer.

Another object of the invention is to provide a printer having a record strip on which successive lines of matter are printed with means for making the last print visible.

Still another object of the invention is to provide a printer with an improved record strip mechanism which is of simple and low cost construction, yet is rugged, reliable and accurate.

A further object of the invention is to provide a printer having a record strip on which successive lines of matter are printed with improved means for selectively varying the spacing of the successive lines of printed matter.

Another object of the invention is to provide a printer having a record strip on which successive lines of matter are printed with means for keeping the record strip in a predetermined path through the printer.

Other objects and advantages will be apparent from the following description in which reference is had to the accompanying drawings.

According to the invention, a printer is provided with a basic printing mechanism which is shown and described in U.S. application Serial No. 693,975 filed November 1, 1957, in the names of Clarence E. Adler and Geoffrey T. Gray, now U.S. Patent No. 2,922,361, to which the record strip mechanism is added. The record strip mechanism of the invention includes a record strip ejector which ejects the record strip from the printer a sufficient distance after every printing cycle to make the last print visible, the record strip being drawn into the printer just before the next print is made, a record strip line spacer which is very accessible and easily adjustable to vary selectively the spacing of the lines of printed matter on the record strip, printed impressions being spaced uniformly along the strip after an adjustment has been made, and a record strip alignment device which is a paper tracking mechanism that keeps the record strip in a predetermined path through the printer.

A preferred form of the printer is illustrated in the accompanying drawings.

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In the drawings:

FIG. I is a perspective view of a weighing scale dial mechanism showing the location of the printer as it is mounted on a weighing scale;

FIG. II is a fragmentary, enlarged elevational view of the printer which is shown in FIG. I with its case removed as seen from a position to the left of the printer looking toward the printer, essentially only the record strip mechanism of the invention being shown;

FIG. III is an elevational view of the printer as illustrated in FIG. II as seen from a position to the left of the printer looking toward the printer;

FIG. IV is an elevational view of the printer as illustrated in FIG. III as seen from a position to the left of the printer looking toward the printer with certain basic printing mechanisms being added to show the overall operations of the printer;

FIG. V is a vertical sectional view taken along the line V—V of FIG. III, with certain basic printing mechanisms being added to show the overall operation of the printer;

FIG. VI is an enlarged fragmentary view which corresponds to FIG. II and which shows the record strip mechanism in solid lines in its strip retracting position and which indicates in broken lines its strip ejecting position;

FIG. VII is an enlarged fragmentary view which corresponds to FIG. III, parts being shown in section to reveal interior details; and

FIG. VIII is an elevational view of the mechanism shown in FIG. VII as seen from a position to the right of the mechanism.

These specific figures and the accompanying description are intended merely to illustrate the invention and not to limit its scope.

For the purpose of illustration, the printer of the invention is shown in connection with an ordinary dial type weighing scale. Such a scale comprises a dial housing 1 that contains automatic load counterbalancing and indicating mechanism which includes an indicator 2 that is rotated through increments of angle which are proportional to increments of weight applied to the scale and that indicates such weights on a stationary indicia-bearing chart 3. The dial housing is mounted on the top of a scale column 4 of which only the top portion is shown in FIG. I.

Mechanical chart reading mechanism which is shown and described in the foregoing U.S. application Serial No. 693,975 is located within the dial housing 1 and is cable-connected to the printer which is contained within its housing 5 and case 6 and operated according to the scale readings. The printer may be operated by any of the usual means for setting up printing members, such as type wheels or sectors, or by hand.

The basic printing mechanism within the printer case 6 is shown and described in detail in the foregoing U.S. application Serial No. 693,975 to which the record strip mechanism of the invention is added. The basic printing mechanism includes cables 7 one of which is shown in FIG. IV, one for each decade in for example a four place number, that are led through Bowden cable casings 8 ends of which are supported by means of a cable guide shaft 9 stationarily mounted within the case 6 and that run from the dial housing 1 into the case 6. One end of each of the cables 7 is connected to the mechanical chart reading mechanism and the other end of each of the cables 7 is connected to a return spring 10 which springs are hooked on a stationary threaded shaft 11 within the case 6, each of the cables 7 being secured intermediate its ends to a weight printing sector 12 having printing type 13 on its periphery in a printing station 14 (FIG. V).

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The printing sectors 12 are rotatably mounted on a stationary sector shaft 15 extending horizontally from a vertical end frame 16 which also functions as a support for the cable guide shaft 9 and the threaded shaft 11. A strut 17, fixed on the cable guide shaft 9, has a hole through which the stationary sector shaft 15 passes and functions to print "LB." Additional printing sectors may be rotatably mounted on the sector shaft 15. Each of the auxiliary printing sectors is rotated into printing position by punching any one of the vertical rows of keys or buttons 18 shown on the front of the printer case 6 in FIG. I, there being ten of the keys representative of the numbers from zero through nine, as shown and described in U.S. application Serial No. 744,754 filed on June 26, 1958, in the name of Geoffrey T. Gray, now U.S. Patent No. 3,001,471.

The basic printing mechanism is driven by means of a horizontal shaft 19 (FIGS. II, III and VI) which is driven in turn by the motor of the mechanical chart reading mechanism. FIG. II corresponds to FIG. XVII in the foregoing U.S. application Serial No. 693,975, most of the basic printing mechanism being omitted and the record strip mechanism of the invention being added in such FIG. II. End frame 16 and shaft 19 correspond directly to end frame 83 and to shaft 77 respectively in FIG. XVII of the copending application. Every time that the chart reading mechanism makes a weight reading it sets up the printing sectors 12 by means of the cables 7 and also turns the shaft 19 through one revolution to make a print. The shaft 19 drives the printing mechanism in the case 6 and also the roller printer in the housing 5 as shown and described in the foregoing U.S. application Serial No. 693,975 and also the record strip mechanism of the invention by means of a cam 20 which is attached to a hub 21 that is pinned by means of a pin 22 to the shaft 19, the cam 20 being located on the shaft 19 adjacent a cam which is not shown but which is shown as cam 82 in the foregoing FIG. XVII of the copending application and which functions to drive part of the basic printing mechanism. In other words, in adding the record strip mechanism of the invention to the basic printer, the cam 20 for driving the record strip mechanism is added to the cams already on the drive shaft. Also, in adding the record strip mechanism to such basic printer, a reciprocable cam follower plate 23 which corresponds to plate 88 shown in the foregoing FIG. XVII of the copending application is modified by having an open-ended slot 24 formed in its upper edge. The cam follower plate 23, which is driven by the shaft 19, is reciprocated as indicated by the double-ended arrow in FIG. II.

The cam follower plate 23 drives an inked ribbon 25 (FIG. IV) and a translucent record strip 26 (FIG. IV) as shown and described in the foregoing U.S. application Serial No. 693,975. The inked ribbon 25 is moved back and forth around a curved guide strip 27, secured to the end frame 16, through the printing station 14. The translucent record strip 26 is moved in the direction indicated by the single-ended arrows in FIG. IV around a curved guide strip 28, also secured to the end frame 16, which is in slightly spaced relationship with the guide strip for the inked ribbon, through the printing station 14. Shafts 29 for the inked ribbon and the translucent record strip are journaled in a removable end plate 30.

A record strip 31 is guided through the printing station 14 between the bottom of the printer case 6 and the top of a table 32 which forms the top of the printer housing 5 and which supports the record strip 31 to receive an imprint in juxtaposition with the printing type 13 in the printing station 14. The record strip 31 corresponds functionally to the ticket which is shown and described in the foregoing application Serial No. 693,975. After the printing sectors 12 are set up to print the weight of a load upon the weighing scale and the inked ribbon 25, the translucent record strip 26 and the record strip 31 are

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moved into place, the roller printer mechanism contained within the printer housing 5 completes the printing operation. The structure and operation of the roller printer are shown and described in the foregoing application Serial No. 693,975. The roller printer runs in a slot 33 in the top of the table 32. The record strip 31 is pressed by the roller printer against the inked ribbon 25, the inked ribbon against the translucent record strip 26, and the record strip 26 against the face of the type 13, there being openings in the bottoms of the inked ribbon guide 27 and the record strip guide 28 at the printing station 14 to permit this to take place. Since the inked ribbon is pinched between the record strips, an inked imprint is made on each, the imprint on the record strip 31 being read directly while the imprint on the translucent record strip 26 is read through the strip from the back or unprinted side of the strip, the translucent strip 26 being retained inside the printer for record purposes.

The record strip 31 is supplied from a roll on a cardboard cylinder 34 that is forced over projections 35 on a horizontal shaft 36, which is rotatably mounted on the vertical end frame 16, and that abuts a ring 37 snapped in a circumferential groove in the shaft. The projections 35 retain the cardboard cylinder 34 on the shaft 36 and the ring 37 locates the cylinder 34 axially. The left hand end of the shaft 36 as seen in FIG. III is journaled in an eccentric bearing 38 which is adjustably attached to the removable end plate 30 by means of a nut 39. A plate 40 is stationarily mounted at 41 from the vertical end frame 16 and a horizontal rod 42 is stationarily mounted, as by riveting, from the plate 40. A plate 43 is held stationarily on a threaded tenon 44 on the rod 42 by means of a nut 45. During assembly, the plate 40 and the rod 42 are located in a predetermined position by means of a pin 46, projecting from the end frame 16, that abuts the plate 40. An idler roller 47 is journaled in the plates 40 and 43 and is turned by the record strip 31 as it is drawn from the supply roll.

A brake spring 48 has its one end wrapped around the stationary rod 42 between two rings 49, clipped in circumferential grooves in the rod 42, to support the spring and its other end caught under a horizontal rod 50 (FIG. II) mounted on the end frame 16. The brake spring 48 normally is straight but catching it under the rod 50 bends it in a curve against the periphery of the record strip roll as shown in FIGS. II and IV retarding turning of the roll. When the record strip roll is large and tends to have a high inertia overrun, the spring 48 presses against the roll with relatively high force. As the roll becomes smaller, the spring 48 tends to straighten out and supplies a smaller and smaller force.

After passing over the idler roller 47, the record strip 31 is guided between the legs 51 of a guide 52 that is carried by a horizontal rod 53 which is stationarily mounted at 54 from the vertical end frame 16 and then passes between an upper and a lower pinch roll 55 and 56, through the printing station 14 (FIG. V) and out of the printer as shown in FIG. I.

A plate 57 secured to the removable plate 30 by means of screws 58 serves to journal a threaded and tenoned end of an oscillatable shaft 59 which has its other end journaled in the vertical end frame 16. A collar 60 on the oscillatable shaft 59 limits axial movement of the shaft to the right as viewed in FIG. III and the plate 57 limits axial movement of the shaft 59 to the left. A plate 61 is forced against a shoulder on the oscillatable shaft 59 by means of a nut 63 so that the plate 61 and the shaft 59 moves as one. A spacer 64 (FIG. III) is forced against a shoulder 65 (FIG. VII) on the right hand end of the oscillatable shaft 59 as viewed in FIGS. III and VII by means of a plate 66 having ears 67 and 68 which is forced in turn against the spacer by means of a nut 69 so that the plate 66 and the shaft 59 move as one. In order that the plates 61 and 66 which are fixed to the oscillatable shaft 59 to move as one there-

with be properly aligned with each other, aligned flats (not shown) on the ends of the shafts 59 are received in holes in the plates which have flat portions which co-operate with the aligned flats to properly locate the plates on the shaft.

A plate 90 is journaled at 91 in the plate 61 and a plate 92 is journaled at 93 in the plate 66, a hexagonal shaped rod 94 rigidly connecting the plates 90 and 92 together. The upper pinch roll 55 is secured on a shaft 95 that is journaled at 96 in the plate 61 and at 97 (FIG. II) in the plate 66. The lower pinch roll 56 is secured on a shaft 98 which is journaled at 99 in the plate 90 and at 100 in the plate 92. A tenon 101 on the shaft 98 extends beyond the journal at 100 through an oversize hole 102 in the plate 66. A spring 103 connected between the plate 90 and the plate 61 and a spring 104 connected between the plate 92 and the plate 66 urge the lower pinch roll 56 toward and against the upper pinch roll 55. The amount that the pinch rolls 55 and 56 can be spread apart in loading the printer with a new record strip 31 is limited to protect the springs 103 and 104 against overstretching by the tenon 101 on the shaft 98 contacting the edge of the oversize hole 102 in the plate 66. A return spring 105 connected between a horizontal stud 106 stationarily mounted from the end frame 16 and the plate 66 urges the plates 66 about the axis of the oscillatable shaft 59 to which it is fixed and the ear 68 on the plate 66 against a stop 107 that is carried by a bracket 108 which is secured to the end frame 16.

The lower pinch roll shaft 98 carries a gear 109 which meshes with a gear 110 on the upper pinch roll shaft 95. The upper pinch roll shaft 95 also carries a pinion 111 having a hub 112 (FIG. VII) which is pinned to the shaft 95. A hub 113, best shown in FIG. VII, is loosely mounted on the oscillatable shaft 59 in a groove formed by a shoulder 114 on the shaft 59 and the spacer 64 (FIG. III) on the shaft 59 so that the hub 113 is rotatable independently of the shaft 59. An arm 115 also is loosely mounted on the oscillatable shaft 59 so that it also is rotatable independently of the shaft 59; axial movement of the arm 115 to the left as viewed in FIGS. III and VII is limited by means of a boss 116 on the end frame 16 in which the shaft 59 is journaled. A ratchet wheel 117 and a gear 118 are mounted side by side in a groove formed by the arm 115 and a shoulder 119 on the hub 113, the ratchet wheel 117, the gear 118 and the hub 113 being pinned together by means of pins 120 to be rotatable as one on the shaft 59. The gear 118 is meshed with the pinion 111. A clutch 121 is loosely mounted on the hub 113 in a groove formed by the gear 118 and a shoulder 122 on the hub 113. The clutch 121 is linked to the arm 115 by means of a driving stud 123 which is riveted to the arm 115 and which has a tenoned end that is received in an oversize hole 124 in the clutch 121. An anti-backup pawl 125 which is pivoted at 126 to the bracket 108 is urged toward the teeth of the ratchet wheel 117 by means of a spring 127 that is carried by the bracket 108. As viewed in FIG. VIII, the pawl 125 prevents movement of the ratchet wheel 117 and, hence, the gear 118 and the hub 113 pinned to the ratchet wheel 117 in a counterclockwise direction. The clutch 121 is so formed as shown in FIG. VIII that counterclockwise movement of the clutch about the axis of the hub 113 with the ratchet wheel 117 latched by the pawl 125 against movement tends to allow the clutch to open up and slip on the hub 113 and that clockwise movement of the clutch about the axis of the hub 113 tends to close or grip the clutch on the hub. Hence, during counterclockwise movement of the clutch 121 the clutch merely slips on the hub 113 but during clockwise movement of the clutch 121 the clutch turns the hub clockwise together with the gear 118 and the ratchet wheel 117 connected thereto.

The clockwise movement of the gear 118 as viewed in FIG. VIII turns the pinion 111 meshed therewith counterclockwise which drives the upper pinch roll shaft

95 on which it is mounted counterclockwise. Counterclockwise rotation of the shaft 95 turns the gear 110 mounted thereon in the same direction which gear 110 drives the gear 109 mounted on the lower pinch roll shaft 98 in the opposite or clockwise direction causing clockwise rotation of the lower pinch roll shaft 98. Counterclockwise rotation of the upper pinch roll shaft 95 and clockwise rotation of the lower pinch roll shaft 98 as viewed in FIG. II cause in turn counterclockwise rotation of the upper pinch roll 55 and clockwise rotation of the lower pinch roll 56 which are mounted on the respective shafts 95 and 98 to advance the record strip 31 which is pinched between the rolls 55 and 56.

The arm 115 is provided with an open-ended slot 128 which receives a driving stud 129 which is riveted to the lower end of an arm 130 that is provided with a slot 131 which receives a stud 132 stationarily mounted in a boss 133 on the end frame 16 to rotatably mount the arm 130. The stud 132 is provided with a relatively large integral collar 134 against which the arm 130 moves. A spacer block 135 is rotatably mounted on the stud 132 adjacent the rotatably mounted arm 130 and an arm 136 is rotatably mounted on the stud 132 adjacent the spacer block, a ring 137 being snapped in a circumferential groove in the stud to retain the arms 130 and 136 with the block 135 therebetween on the stud. A bolt 138, which is received in the slot 131 in the arm 130 and which extends through the spacer block 135 and the arm 136, and a nut 139 connect the arms 130 and 136 and the spacer block 135 together so that they are rotatable about the axis of the stud 132 as one. The arm 136 is operatively connected to the cam follower plate 23 by means of a double-flanged bearing 140 that is carried by the lower end of the arm 136, the edges of the slot 24 in the cam follower plate 23 being received between the flanges of the bearing 140.

Reciprocation of the cam follower plate 23 to the left as viewed in FIGS. II and VIII pivots the arms 136 and 130 clockwise about the axis of the stud 132. This rocks the arm 115 which is operatively connected to the arm 130 by means of the driving stud 129 counterclockwise about the axis of the oscillatable shaft 59 and also the clutch 121 which is operatively connected to the arm 115 by means of the driving stud 123 counterclockwise about the axis of the hub 113, the hub 113 being latched against movement through its rigid connection with the ratchet wheel 117 by means of the anti-backup pawl 125 during such counterclockwise movement of the clutch 121. Movements of the foregoing parts take place in the opposite directions during reciprocation of the cam follower plate 23 to the right causing the clutch 121 to turn the hub 113 clockwise together with the gear 118 and the ratchet wheel 117 pinned to the hub to advance the record strip 31 which is pinched between the rolls 55 and 56 as hereinbefore described. Hence, during each back and forth movement of the cam follower plate 23, the record strip 31 is advanced a predetermined distance to space printed impressions uniformly along the strip.

One of the features of the printer is the relatively simple construction of the record strip line spacer which includes the foregoing clutch 121 and its drive, the hub 113, ratchet wheel 117 and gear 118 which are driven by the clutch, and the gear driven pinch rolls which advance the record strip. Although of relatively simple construction, the record strip line spacer is rugged, reliable and meters the record strip 31 accurately. The record strip line spacer is very accessible for adjustments and easily adjustable to vary selectively the spacing of the lines of printed matter on the record strip 31, printed impressions being spaced uniformly along the strip after an adjustment has been made.

Access to the record strip line spacer is made by opening up the back of the printer case 6 which opens as a door as shown and described in the foregoing U.S. application Serial No. 744,754. The adjustments to vary selec-

tively the spacing of the lines of printed matter on the record strip 31 are made by loosening the nut 139 on the bolt 138 and sliding the arm 130 up or down relative to the bolt 138 and relative to the stud 132, the slot 131 in the arm 130 being provided for this purpose. This changes the position of the driving stud 129 and on the arm 130 in the slot 128 in the arm 115 which drives the clutch 121 changing the radius between the driving stud 129 and the axis of the hub 113. Moving the plate 130 up causes the clutch 121 to be driven back and forth through a smaller arc and, hence, the pinch rolls 55 and 56 operatively connected to the clutch to be turned a smaller amount to make the spaces between the lines of printed matter on the record strip 31 smaller. Moving the plate 130 down makes the spaces between the printed lines larger. The upper part of the arm 130 is bent over to form a handle 141 to facilitate grasping the arm 130 in making the line spacing adjustments.

Another feature of the printer is in a record strip ejector which ejects the record strip 31 from the printer a sufficient distance after every printing cycle to make the last print visible, the record strip being drawn into the printer just before the next print is made and which includes the oscillatable shaft 59 and the plates 61 and 66 which move as one with the shaft 59 and which carry the pinch rolls 55 and 56 between them, the shaft 95 for the upper roll 55 being journaled directly in the plates 61 and 66 and the shaft 98 for the lower roll 56 being journaled in the plates 90 and 92 which in turn are journaled in the plates 61 and 66, respectively, to be rockable along with the oscillatable shaft 59. The record strip ejector is a means for indicating the last print exteriorly of the printer. Normally, as hereinbefore described, the return spring 105 urges the plate 66 about the axis of the oscillatable shaft 59 causing the ear 68 on the plate 66 to be against the stop 107. This is the position of the record strip ejector shown in FIG. II. In this position of the ejector, a printing cycle has been completed and the record strip 31 has been ejected to make the last print 142 (FIG. I) visible from outside of the printer case 6. The record strip line spacer hereinbefore described is operable independently of the record strip ejector, i.e., the line spacer functions as described whether or not the strip ejector is used. The strip ejector can be kept in a non-operating position in its position shown in FIG. II by simply not driving it by means of the cam 20 which is provided for that purpose without affecting the functioning of the line spacer. On the other hand, the strip ejector can be driven by the cam 20 and the line spacer still operates as described.

In operation, the cam 20 is shown in FIG. II in its rest position after a printing cycle has been completed and the record strip 31 has been ejected. In the overall operation of the printer, the shaft 19 turns the cam 20 through one revolution for each printing cycle in a counterclockwise direction as viewed in FIG. II and drives the cam follower plate 23 first to the left and then to the right through one reciprocation. As soon as the cycle is initiated, the chart reading mechanism which is located in the dial housing 1 sets up, by means of the cables 7, the printing sectors 12 according to the weighing scale reading and the cam follower plate 23 is moved to the left. Movement of the cam follower plate 23 to the left rocks the clutch 121 counterclockwise about the axis of the hub 113 as viewed in FIGS. II and VIII, the clutch 121 slipping on the hub 113 and nothing happening as far as the record strip line spacer is concerned. During a complete reciprocation of the cam follower plate 23, the inked ribbon 25 and the translucent record strip 26 are advanced and the printing sectors 12 finally aligned and locked.

An instant after the cam follower plate 23 starts moving to the left, point A on the cam 20 contacts a roller 143 on the plate 66 and starts driving the plate 66 clockwise about the axis of the oscillatable shaft 59 as viewed in FIG. II. This turns the shaft 59 which is secured to

the plate 66 and also the plate 61 which is secured to the shaft 59 and lifts upwardly the pinch rolls 55 and 56 which are carried by the plates 61 and 66. The record strip 31 which is pinched between the rolls 55 and 56 is drawn into the printer at this time. During the upward movement of the pinch rolls 55 and 56, the pinion 111 on the upper pinch roll shaft 95 rolls on the gear 118. The clutch 121 in addition to driving the gear 118 to advance the record strip 31 for line spacing also functions to provide enough friction so that any tendency of the pinion 111 to drive the gear 118 as it rolls along the gear is overcome. As viewed in FIG. II, the pinion 111 turns clockwise on the gear 118 as it is rolled upwardly thereon causing the record strip 31 to be drawn into the printer an increment more than that caused by the rotation of the pinch rolls 55 and 56 upwardly about the axis of the oscillatable shaft 59. However, somewhere during the upward movement of the pinch rolls 55 and 56, depending upon the location of the driving stud 129 in the slot 128 in the arm 115, the gear 118 is turned clockwise due to the cam follower plate 23 moving to the right as viewed in FIG. II driving the pinion 111 counterclockwise to advance the record strip 31 an increment corresponding to the predetermined spacing between the lines of printed matter. In the complete cycle of the record strip ejector, the pinch rolls 55 and 56 are first rocked upwardly about the axis of the oscillatable shaft 59, the pinion 111 rolling clockwise on the gear 118, and then rocked downwardly about the axis of the oscillatable shaft 59, the pinion 111 rolling counterclockwise on the gear 118, to draw the record strip 31 into the printer for a printing operation and then to eject the record strip 31 so that the last print 142 (FIG. I) is visible. If, during this cycle of the record strip ejector, the record strip line spacer was not operated, the record strip 31 would be drawn into the printer to the same position in the printing station 14 as it was during the previous printing cycle so that one print would be superimposed upon another. However, the operation of the record strip line spacer advances the record strip 31 so that it is drawn into the printing station 14 with the last print advanced enough to provide a fresh space on the record strip for the new print.

As the record strip line spacer is operable independently of the record strip ejector so is the record strip ejector operable independently of the record strip line spacer. If the gear 118 was not operated for line spacing, the record strip 31 would be drawn into the printer to the same position in the printing station 14 by means of the strip ejector as it was during the previous printing cycle as hereinbefore described. However, the record strip 31 may be advanced to space the lines of printed matter by other means such as by hand. The pinch rolls 55 and 56 can be turned by means of a manually operable knob on one of the pinch roll shafts accessible from a point outside of the printer or the record strip 31 can be advanced by pulling on the part of the strip which as shown in FIG. I extends outside of the printer. In the complete cycle of the record strip ejector the cam 20 which drives the ejector is turned one revolution in the direction indicated by the arrow in FIG. II to draw the record strip into the printer and then to eject the record strip and the cam follower plate 23 is reciprocated first to the left during which time the clutch 121 operatively connected to the cam follower plate 23 slips on the hub 113 and then to the right during which time the clutch 121 drives the gear 118 of the record strip line spacer to advance the record strip for line spacing.

The cam 20 drives the record strip ejector upwardly from point A to point B on the cam. The ejector is shown in FIG. II and in dotted lines in FIG. VI in its position just before point A on the cam 20 contacts the roller 143 and in solid lines in FIG. VI in its most upward position wherein point B on the cam 20 contacts the roller 143. Somewhere during the interval of movement

of the cam 20 between points A and B, the roller printer in the housing 5 starts toward the printing station 14 and reaches the printing station just before point B on the cam 20 reaches the roller 143 to press the now fully withdrawn record strip 31 against the face of the printing type to make a print. During printing, one end of the record strip 31 is secured against longitudinal movement by the roller printer while the other end is restrained longitudinally by means of the brake spring 48. While the roller printer is making the print, point B on the cam 20, which is a high spot on the cam, lifts the record strip ejector to its most upward position wherein a flat side of the hexagonal rod 94 contacts the underneath side of a stop or cam member 144, secured to the horizontal rod 53, as shown in solid lines in FIG. VI and in broken lines in FIG. V. The hexagonal rod 94 is rigidly connected to the plates 90 and 92 which journal the lower pinch roll shaft 98. Contact of the hexagonal rod 94 with the stop member 144 stops the upward movement of the lower pinch roll 56 on the shaft 98 but allows the upward movement of the upper pinch roll 55 on the shaft 95 which is journaled in the plates 61 and 66 to continue. This forces the pinch rolls 55 and 56 slightly apart in opposition to the springs 103 and 104 to correct record strip tracking. The pinch rolls 55 and 56 are forced apart for only an instant, since the high spot on the cam 20 at point B is relatively short. The stop member is secured to the horizontal rod 53 by means of two screws 145 which are received in oversize slots 146 in the member so that the position of the member is adjustable for the minimum parting of the pinch rolls which will correct record strip tracking. The roller printer completes its printing before the cam 20 moves from point B to point C, the cam 20 falling away from the roller 143, at point C and continuing on to its home position that is shown in FIG. II.

As soon as the cam 20 falls away from the roller 143 at point C, the printing operation being completed at this time, the pinch rolls 55 and 56 are pivoted counterclockwise as viewed in FIG. II by means of the return spring 105 connected to the plate 66 into their home positions shown in FIG. II to eject the record strip 31 that is pinched between the pinch rolls 55 and 56 for enough out of the printer so that the last print 142 (FIG. I) is visible. In order to cushion the return of ejecting mechanism against the stop 107, an ordinary air dashpot 147 is provided which has its plunger 148 operatively connected at 149 to the ear 67 of the plate 66 and which is supported on a bracket 150 rotatably mounted on the stud 106. The rotatable mounting of the dashpot 147 compensates for the arcuate motion of the ear 67 to which the dashpot is operatively connected.

After the record strip 31 passes through the pinch rolls 55 and 56, it moves over a paper guide 151 (FIG. V) which has two hooks 152, one of which is shown in FIG. V, loosely hooked over the lower pinch roll shaft 98 one on either side of the lower pinch 56 to mount the paper guide pivotally on the shaft. The lower end 153 of the paper guide is held by means of gravity against a forwardly sloping surface of a stationary guide 154 secured to the table 32. As the strip ejector is operated, the paper guide 151 rocks about the axis of the shaft 98 and guides the record strip 31 as shown in FIG. V so that the record strip cannot get bunched up as it is drawn into and then ejected from the printer. After passing through the printing station 14, the record strip 31 passes through a stationary guide 155 (FIGS. I and V) which is secured to the table 32, which has vertical sides 156 to guide the record strip laterally, and which has a serrated edge 157 located transversely to the path of the record strip and above the record strip against which a section of the record strip is torn off from time to time by a person standing in front of the printer as viewed in FIG. I. Alternatively, instead of being secured to the table 32, the stationary guide 154 can be hung from the rod

53 and the stationary guide can be supported from the housing 5 below the table 32 leaving in each instance the top of the table clear for the insertion of a ticket and carbon into the printing station immediately below the record strip 31. This permits three elements to be printed at once, i.e., such a ticket, the record strip 31, and the translucent record strip 26.

Still another feature of the printer is in the record strip alignment device which is a paper tracking mechanism and which includes the stop member 144 that spreads apart the pinch rolls 55 and 56 in opposition to the springs 103 and 104 to correct record strip tracking. As hereinbefore described, just before point B on the cam 20 reaches the roller 143, the roller printer reaches the printing station 14 and presses the record strip 31 against the face of the printing type to make a print. This secures one end of the record strip 31 against longitudinal movement, the other end always being restrained longitudinally by means of the brake spring 48. While the record strip 31 is so secured, the high spot B on the cam 20 lifts the record strip ejector to its most upward position momentarily wherein the hexagonal rod 94 contacts the stop member 144 causing the pinch rolls to be spread apart. The position of the stop member 144 is such that there is a minimum parting of the pinch rolls which will correct record strip tracking.

The record strip 31 is supplied from the roll on the cardboard cylinder 34 and is guided between the legs 51 of the guide 52 as shown in FIG. V; the guide 52 also being shown in FIG. III. Should the record strip deviate from its predetermined path as it is metered through the pinch rolls 55 and 56, it will be pulled laterally against one or the other of the guide legs 51. The separating of the pinch rolls by means of the stop 144 momentarily during each cycle of the record strip ejector, while the record strip 31 is held against longitudinal movement by means of the roller printer at its one end and restrained against longitudinal movement by means of the brake spring 48 at its other end, allows the record strip to move laterally or to straighten out, since the two places at which it is held against longitudinal movement are aligned in the predetermined path of the record strip and since there is a force against the edge of the record strip at the guide leg 51 against which such edge is pulled when it deviates from its predetermined path.

The record strip alignment device is operable independently of either the record strip line spacer or the record strip ejector. That is, it is not necessary that the record strip ejector be oscillated to have the pinch rolls 55 and 56 spread apart by the stop member 144. The strip ejector can be held inoperable by simply not having the cam 20 operate it and the record strip alignment device still is operable by moving the stop member 144 by some means not shown against the hexagonal rod 94 to spread apart the pinch rolls.

The embodiment of the record strip mechanisms described in connection with the drawings is to be regarded as illustrative only since the invention is susceptible to variation, modification and change within the spirit and scope of the appended claims.

Having described the invention, I claim:

1. In a printer, in combination, means so defining a printing station that the station is hidden from view, roller means for driving a record strip, movably mounted roller mounting means for rotatably mounting the roller means, the record strip being movable in steps through the printing station to be printed with successive lines of printed matter, drive means for operating the printer, and means operatable in synchronism with the drive means for so moving the roller mounting means that the record strip is ejected from the printing station a distance sufficient to make the last print visible exteriorly of the printer and is returned to the printing station to receive the next print.

2. In a printer, in combination, means so defining a

printing station that the station is hidden from view, oscillatable and rotatable record strip means for so driving a record strip that it is movable by rotation of the record strip means through the printing station to be printed with successive lines of printed matter, oscillation and rotation of the record strip means occurring about different axes, drive means for operating the printer, and means operating in synchronism with the drive means for oscillating the record strip means to eject the record strip after a print has been made from the printing station so that the last print is visible and to withdraw the record strip before the next print is to be made into the printing station.

3. In a printer, in combination, means so defining a printing station that the station is hidden from view, a pair of pinch rolls between which a record strip is movable, roll mounting means for rotatably mounting the rolls, the record strip being movable through the printing station to be printed with successive lines of printed matter, drive means for operating the printer, and means operating in synchronism with the drive means for so moving the roll mounting means that the record strip is ejected from the printing station a distance sufficient to make the last print visible exteriorly of the printer and is returned to the printing station to receive the next print.

4. In a printer, in combination, means so defining a printing station that the station is hidden from view, drive means for operating the printer, a pair of pinch rolls between which a record strip is movable, and oscillatably mounted roll mounting means for rotatably mounting the rolls on first and second axes, the roll mounting means being oscillatable about a third axis in synchronism with the drive means for ejecting the record strip from the printing station to make the last print visible exteriorly of the printer.

5. In a printer, in combination, means so defining a printing station that the station is hidden from view, drive means for operating the printer, a pair of pinch rolls between which a record strip is pinchable, the record strip being movable through the printing station to be printed with successive lines of printed matter, oscillatably mounted roll mounting means for rotatably mounting the rolls on first and second axes, the roll mounting means being oscillatable about a third axis in synchronism with the drive means for ejecting the record strip from the printing station to make the last print visible, and means operable during oscillation of the roll mounting means for rotating the rolls to advance the record strip for line spacing.

6. In a printer, in combination, means so defining a printing station that the station is hidden from view, a pair of pinch rolls between which a record strip is pinchable, the record strip being movable through the printing station to be printed with successive lines of printed matter, oscillatably mounted roll mounting means for rotatably mounting the rolls on first and second axes, the roll mounting means being oscillatable about a third axis for ejecting the record strip from the printing station to make the last print visible, and gear means operable during oscillation of the roll mounting means for rotating the rolls to advance the record strip for line spacing, the gear means including a first gear carried by the roll mounting means and operatively connected to the pinch rolls and a second gear which is meshed with the first gear for rotating the rolls to advance the record strip for line spacing and on which the first gear rolls during oscillation of the roll mounting means.

7. In a printer, in combination, means so defining a printing station that the station is hidden from view, a pair of pinch rolls between which a record strip is pinchable, the record strip being movable through the printing station to be printed with successive lines of printed matter, oscillatably mounted roll mounting means for rotatably mounting the rolls on first and second axes, the roll mounting means being oscillatable about a third

axis for ejecting the record strip from the printing station to make the last print visible, means operable during oscillation of the roll mounting means for rotating the rolls to advance the record strip for line spacing, and means engaging the roll mounting means during oscillation of the roll mounting means for parting the pinch rolls to correct record strip tracking.

8. In a printer, in combination, means defining a printing station, rotatably and oscillatably mounted roller means for driving a record strip, rotation and oscillation occurring about different axes, means including a rotatably mounted member for rotating the roller means in accordance with the size of the arc in which the member is oscillated and thus for advancing the record strip through the printing station to be printed with successive lines of printed matter, first drive means for oscillating the member, the first drive means being adjustable to vary selectively the size of the arc and thus to vary selectively the spacing of the lines of printed matter, and second drive means operable during oscillation of the member for oscillating the roller means to eject the record strip from the printing station to make the last print visible.

9. In a printer, in combination, means defining a printing station, rotatably and oscillatably mounted roller means for driving, a record strip, rotation and oscillation occurring about different axes, means including rotatably mounted clutch means, a gear driven in one direction only by the clutch means and gear means meshed with the gear and operatively connected to the roller means for rotating the roller means in accordance with the size of the arc in which the clutch means is oscillated and thus for advancing the record strip through the printing station to be printed with successive lines of printed matter, means for so oscillating the roller means that the gear means rolls on and about the gear for ejecting the record strip from the printer to make the last print visible and for then returning the record strip to the printing station for the next print, and drive means for oscillating the clutch means, the drive means being adjustable to vary selectively the size of the arc and thus to vary selectively the spacing of the lines of printed matter.

10. In a printer, in combination, means defining a printing station, a pair of rotatably and oscillatably mounted pinch rolls between which a record strip is pinchable, rotation and oscillation occurring about different axes, means including rotatably mounted clutch means, a gear driven in one direction only by the clutch means and gear means meshed with the gear and operatively connected to the pinch rolls for rotating the pinch rolls in accordance with the size of the arc in which the clutch means is rocked and thus for advancing the record strip in steps through the printing station to be printed with successive lines of printed matter, means for so oscillating the pinch rolls that the gear means rolls on and about the gear for ejecting the record strip a distance large relative to one of the steps from the printer to make the last print visible and for then returning the record strip to the printing station for the next print, and drive means for rocking the clutch means.

11. In a printer, in combination, means defining a printing station, a pair of rotatably and oscillatably mounted pinch rolls between which a record strip is pinchable, rotation and oscillation occurring about different axes, means including rotatably mounted clutch means, a gear driven in one direction only by the clutch means and gear means meshed with the gear and operatively connected to the pinch rolls for rotating the pinch rolls in accordance with the size of the arc in which the clutch means is rocked and thus for advancing the record strip in steps through the printing station to be printed with successive lines of printed matter, means for so oscillating the pinch rolls that the gear means rolls on and about the gear for ejecting the record strip a distance large relative to one of the steps from the printer to make the last

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print visible and for then returning the record strip to the printing station for the next print, and drive means for rocking the clutch means, the drive means being adjustable to vary selectively the size of the arc and thus to vary selectively the spacing of the lines of printed matter.

12. In a printer having a printing station, in combination, mounting means for rotatably mounting a rolled supply of a record strip, selectively positionable printing type in the printing station, printing means for pressing the record strip against the printing type to make a print, oscillatably mounted pinch roll means comprising rotatable pinch rolls for pulling the record strip from the rolled supply and advancing it through the printing station, a stationarily mounted guide for guiding the record strip laterally, the record strip being moved in a predetermined path between the rolled supply and the printing station, deviation from the predetermined path forcing an edge of the record strip against the guide, a stationarily mounted stop member, and means for moving the oscillatably mounted pinch roll means against the stop member while the record strip is pressed by the printing means against the printing type to separate the pinch rolls, whereby, should the record strip have deviated from its predetermined path, it automatically moves laterally away from the guide back into such path.

13. In a printer having a printing station, in combination, mounting means for rotatably mounting a rolled supply of a record strip, selectively positionable printing type in the printing station, printing means for pressing the record strip against the printing type to make a print, pinch roll means comprising rotatable pinch rolls for pulling the record strip from the rolled supply and advancing it through the printing station, the record strip being moved in a predetermined path between the rolled supply and the printing station, and means operating in synchronism with the printing means for parting the pinch rolls while the record strip is pressed by the printing means against the printing type to correct possible record strip deviation from the predetermined path.

14. In a printer having a printing station, in combina-

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tion, mounting means for rotatably mounting a rolled supply of a record strip, pinch roll means comprising rotatable pinch rolls for pulling the record strip from the rolled supply and advancing it through the printing station, a stationarily mounted guide for guiding the record strip laterally, the record strip being moved in a predetermined path between the rolled supply and the printing station, deviation from the predetermined path forcing an edge of the record strip against the guide, and means for parting intermittently the pinch rolls to correct record strip tracking.

15. In a printer, in combination, means so defining a printing station that the station in hidden from view, oscillatable and rotatable record strip drive means for so driving a record strip that it is movable by rotation of the record strip means through the printing station to be printed with successive lines of printed matter, oscillation and rotation of the record strip drive means occurring about different axes, the record strip drive means being oscillatable for ejecting the record strip from the printing station to make the last print visible, and gear means operable during oscillation of the record strip drive means for rotating the record strip drive means to advance the record strip for line spacing, the gear means including a first gear operatively connected to the record strip drive means and a second gear which is meshed with the first gear for rotating the first gear for line spacing and on which the first gear rolls during oscillation of the record strip drive means.

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