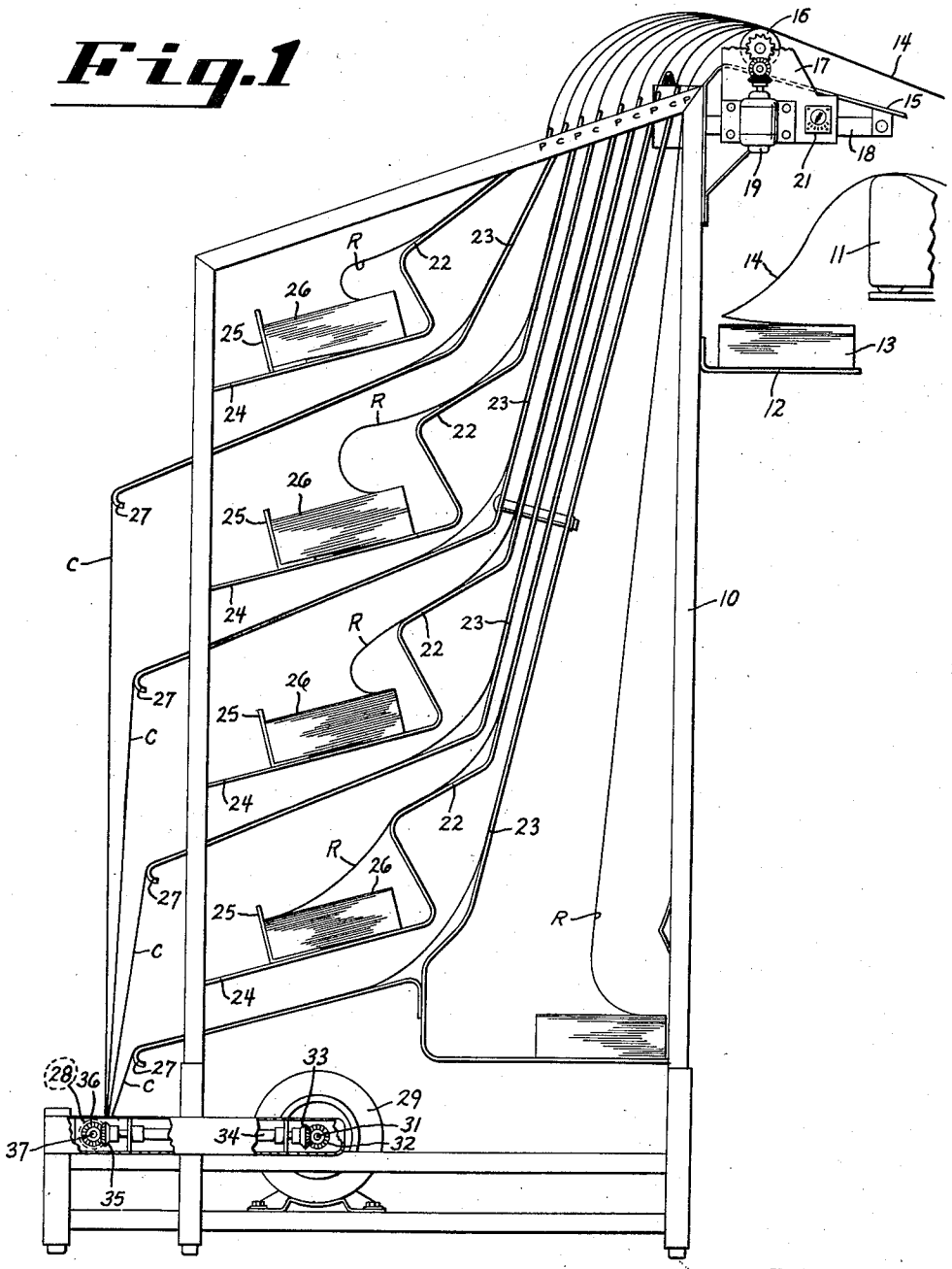
Sept. 15, 1959 A. W. METZNER 2,904,332

STRIP HANDLING DEVICE

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Fig. 1



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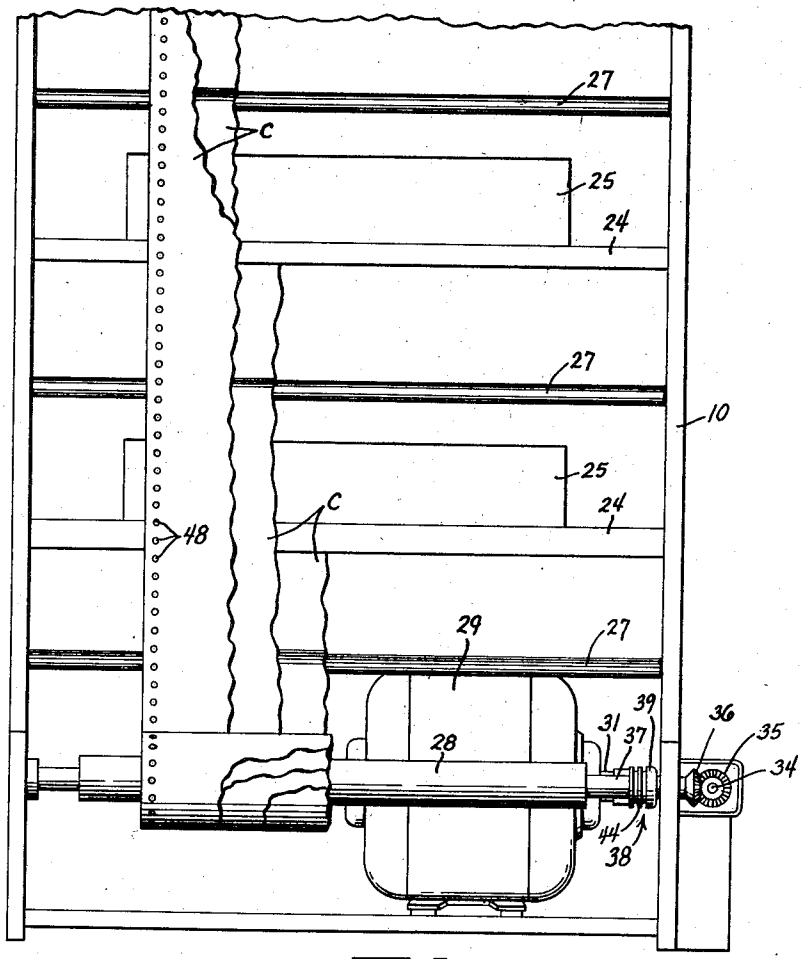
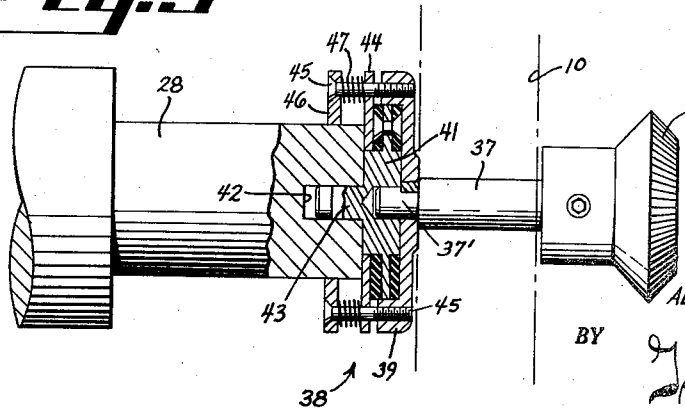


Fig. 2

Fig. 3



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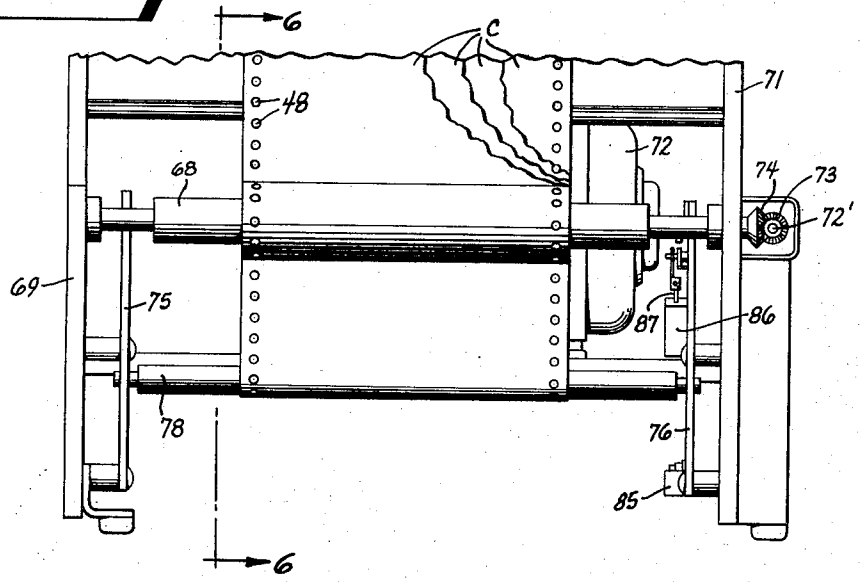
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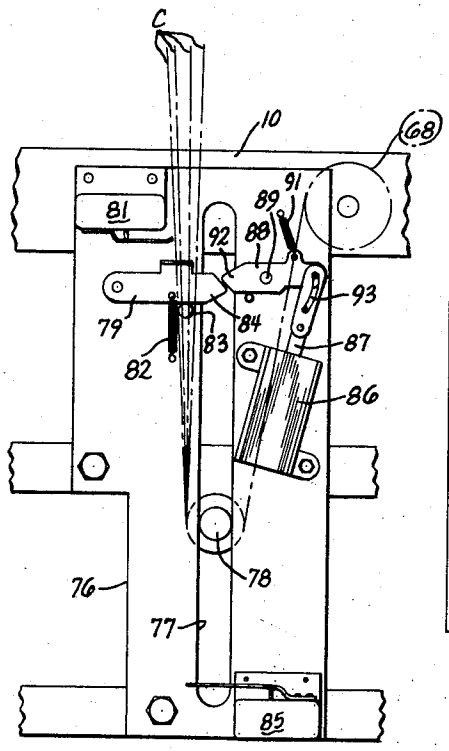
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STRIP HANDLING DEVICE

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Fig. 4.





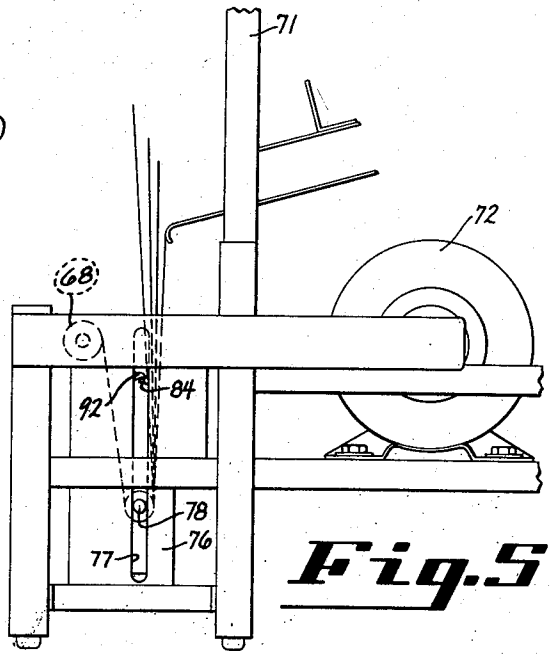


Fig. 5

Fig. 6

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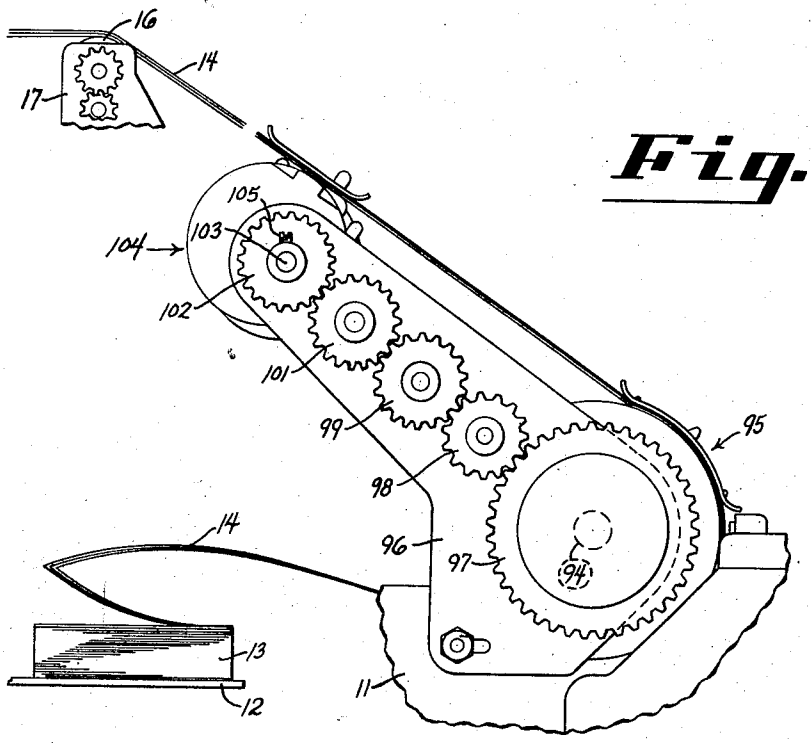


Fig. 7

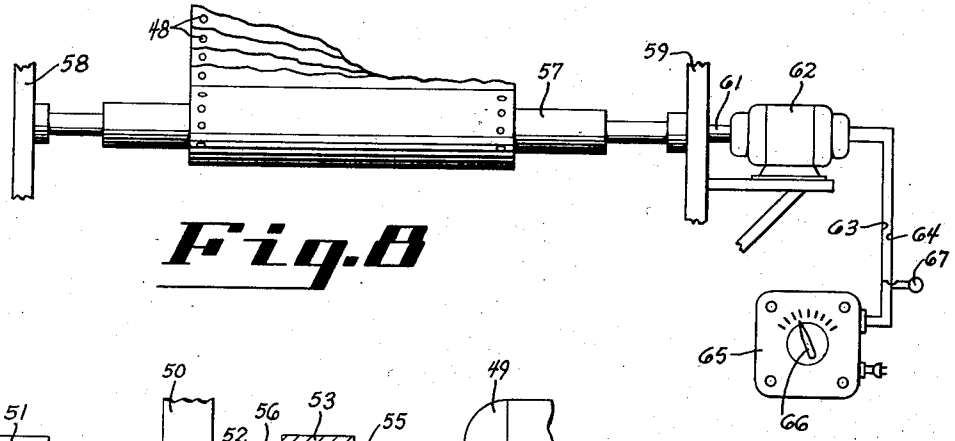


Fig. 8

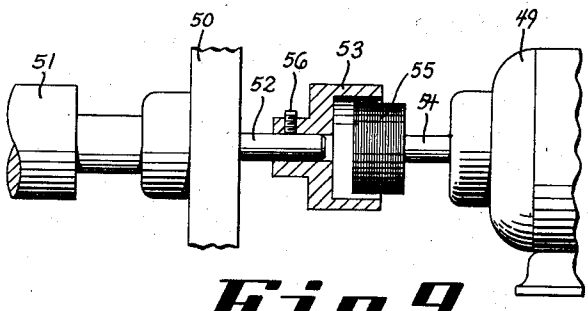


Fig. 9

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2,904,332

STRIP HANDLING DEVICE

Albert W. Metzner, Dayton, Ohio, assignor to The Standard Register Company, Dayton, Ohio, a corporation of Ohio

Application September 15, 1955, Serial No. 534,479

11 Claims. (Cl. 271—2.1)

This invention relates to strip feeding and separating apparatus, and particularly to a means for neatly disposing of used carbon strip material without the need for attention by an operator.

In business machine practice, manifold record strip material is used comprising superposed record strips interleaved with transfer or carbon strips for the making of multiple copies. After passage through the recording machine the strip assembly is separated into its component strip elements so that the separate copies may appropriately be distributed.

It has been known heretofore to provide a separator device encountered by the record strip assembly as it leaves the recording machine, wherein the record strips are separated from one another, and from the interleaved carbon strips, and re-folded into individual packs for greater ease and convenience of handling. The carbon strip material is permitted, in such devices, to pass to a bin or to drop to the floor from which it is periodically collected and thrown to waste, the carbon strip material conventionally used being of the "one-time" variety.

The object of the invention is to simplify the construction as well as the means and mode of operation of strip separators, whereby such separators may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of applications, and be unlikely to get out of repair.

A further object of the invention is to provide a more desirable means of disposing of the separated carbon strips.

A further object of the invention is to provide at the rear of the aforementioned separator device a roll on which the carbon strip material is wound as it leaves the device and from which it may readily be removed when and as desirable.

Another object of the invention is to provide a winding roll as described which is power actuated in order continuously to take up the separated carbon strip material as it is fed to and through the separating device by the strip feeding means of the recording machine.

A further object of the invention is to utilize a single winding roll or spindle for disposing of all of the carbon strips of a record strip assembly.

Still another object of the invention is to operate the described winding roll or spindle by power means operating in conformance with feeding of the strip but independently thereof.

Still another object of the invention is to operate the winding roll or spindle by an independently energized electric motor connected to the roll or spindle by means interposing a yield in such connection whereby to obviate tensioning of the carbon strip material excessively.

A further object of the invention is to provide a strip separator possessing the advantageous structural features, the inherent meritorious characteristics and the mode of operation herein mentioned.

With the above primary and other incidental objects in view as will more fully appear in the specification, the

invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompany drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

Fig. 1 is a view in side elevation of a separator device equipped with a carbon winding roll or spindle in accordance with one illustrated form of the invention;

Fig. 2 is a fragmentary view in rear elevation of the separator device and apparatus of Fig. 1;

Fig. 3 is a detail view, partly broken away, of the connection between the motor and winding roll of Figs. 1 and 2;

Fig. 4 is a fragmentary view in rear elevation of a separator device equipped with a winding roll and mechanism for the actuation thereof in accordance with a second illustrated form of the invention;

Fig. 5 is a view in side elevation of the apparatus shown in Fig. 4;

Fig. 6 is a view in cross section, taken substantially along the line 6—6 of Fig. 4;

Fig. 7 is a detail view of the feeding apparatus of the recording machine, showing the use of a supplemental feeding device operable in connection with the separating mechanism of the instant invention;

Fig. 8 is a fragmentary view in rear elevation of a separator device with carbon winding roll in accordance with a third illustrated form of the invention; and

Fig. 9 is a fragmentary view in rear elevation, partly broken away showing an operating connection between the carbon winding roll and motor in accordance with a fourth illustrated form of the invention.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the drawings, a separator device may comprise, as shown, a frame 10 stationed to the rear of a recording machine 11. On the front of the frame 10, or that side adjacent to the machine 11, there is mounted a shelf 12 supporting a pack 13 of series connected record forms folded along weakened lines intermediate the forms to comprise the pack 13. The record strip material comprises record strip elements R and interleaved carbon strip elements C which together make up a strip assembly 14. The assembly is drawn by suitable strip feeding devices into the machine 11, past a recording mechanism therein, and then passes out of the machine over a table 15 on the frame 10 above the shelf 12. The imprinted record forms thus are guided out of the recording machine as a continuous web and are caused to pass over a booster roller 16 supported between frames 17 on a bracket 18 in common supporting relation to the table 15 and to the frame 17. The roller 16 is driven by an electric motor 19 also supported on the bracket 18 and controlled by a manually operated rheostat 21 which regulates the voltage supplied to the motor and thereby the speed of rotation of the booster roller 16. The booster roller has driving qualities and aids in guiding the record strip material from the recording machine to the separating device at the rear thereof.

Above the frame 10, the record strip material 14 is separated into its component parts, each of which is directed into a separate chute defined by downwardly and rearwardly inclining deflector guides 22 and 23. There is a series of guides 22 and a series of guides 23 arranged in spaced apart alternating relation in the manner indicated. The guide members 22 terminate in a depressed portion 24 on each of which is an upright 25 defining with the portion 24 a tray on which a respective individual record strip component R is refolded to define a refold pack 26.

Each guide member 23 extends between adjacent guides 22 through and beyond the rear of the frame 10 and terminates in a rolled over end 27. The guide members 23 are progressively longer in length from the top of the frame 10 to the bottom thereof, and the several carbon strips C pass over the turned over ends 27 and extend toward the bottom of the frame 10 where they are wound on a roll or spindle 28 supported between side elements of the frame 10. The winding roll or spindle 28 is rotatably driven by an electric motor 29 mounted at the bottom of the frame 10 and having a shaft 31 on which is a bevel gear 32 meshing with a similar gear 33 on one end of a frame supported rotary shaft 34. On the other end of the shaft 34 is a bevel gear 35 meshing with a similar gear 36 on a shaft 37. The latter is in effect an extension of the spindle 28 and is rotatably mounted in the frame 10 and operatively connected to the spindle 28 through a clutch device 38. The clutch 38 is of the friction type and includes a housing 39 suitably secured to a reduced end 37' of the shaft 37. A plate assembly 41 is received within the housing 39 and is supported on the end of shaft 37 with freedom of relative turning motion. That end of the spindle 28 received in the clutch device 38 is formed with a non-circular slot 42 receiving a conformably shaped projection 43 on the plate assembly 41. A pressure plate 44 is rotatably mounted on the plate assembly 41 and is held stationary relative to the housing 39, in a rotary sense, by screws 45 which pass through the pressure plate and into threaded openings in the housing 39. A cover plate 46 surrounds the spindle 28 and mounts the outer ends of the screws 45, there being compression springs 47 interposed between the cover plate 46 and the pressure plate 44.

The motor 29 is continuously energized during the operation of the separating apparatus, and the clutch housing 39, the pressure plate 44 and the cover plate 46 accordingly are continuously in rotation, attempting through the plate assembly 41 to rotate the spindle 28. By adjusting the screws 45 variations are possible in the pressure with which plate 44 engages the plate assembly 41. As a result, the torque resistance necessary to overcome the clutch 38 may be varied. It will further be understood, in the connection, that when the carbon strips C are tensioned, as when there is no feeding of the record strip material 14, the clutch 38 will slip and there will be no rotation of the roll or spindle 28. When the feeding devices of the recording machine begin again to advance the record strip material the carbon strips C go slack, thus releasing the spindle 28 for rotation with the motor 29, and the carbon strip material accordingly is wound on the spindle for as long as the record strip assembly continues to feed into the separator device. When this latter motion is interrupted the continued rotary motion of the spindle 28 quickly re-tensions the carbon strips and the clutch 38 again yields to permit the clutch housing 39 and associated parts extending from the motor 29 to rotate independently of the spindle. In the present instance, the record strip material, including the carbon strips, is shown as having marginal perforations 48, and is of the kind fed or advanced through the recording machine and into the separator device by positively acting pin wheels which engage in the perforations 48. Accordingly, the adjustment of the clutch 38 becomes important since the clutch must slip with the slightest amount of tension placed upon it so that the holes in the record material are not torn by being pulled against the stationary feeding pins. The feed of the record strip material, it will be still further understood, is an intermittent operation which proceeds in steps of irregular length determined at least in part by the quantity and character of the data to be recorded on successive forms.

Another form of clutch mechanism usable in accordance with the overall concept of the present invention is that shown in Fig. 9. Here, a motor 49 is placed in line with a winding roll or spindle 51. The latter has a

rotary mounting in a frame 50 and at its one end extends through and beyond such frame and is formed with a reduced diameter extension 52. Mounted on the reduced diameter extension 52 is a collar or "drag" unit 53. The shaft 54 of the motor 49 has fixed thereto a magnet 55 received in the open outer end of the collar or drag unit 53. As the motor turns, the magnetic forces set up by the magnet 55 induce a following motion of the collar 53 and of the spindle 51 to which it is attached. The motor 49 operates continuously and when the slack in the carbon strips is taken up, the magnet turns within the drag unit until more slack appears in the strip. The drag unit 53 is fixed to the extension 52 of the spindle by means of a set screw 56. By loosening the set screw 56, the drag unit can be moved axially along the spindle shaft. The larger the area of the drag unit acted upon by the magnet the greater the driving power. Thus an accurate adjustment can be made in the amount of torque resistance required to interrupt rotation of the spindle 51. The drag unit can be made of different types of metal or the inner surface may be plated as with copper or brass. Also, while the motor 49 has been disclosed as arranged in line with the spindle 51 an arrangement and bevel gear connection similar to that shown in the embodiment of Figs. 1 to 3 also is possible.

Referring to Fig. 8, in accordance with another means of actuating the carbon winding roll or spindle, a spindle 57 is rotatably mounted between side frames 58 and 59 and has a direct driven connection with the shaft 61 of an electric motor 62. The latter is a low torque stall type motor. As the least amount of load is encountered, the motor will stall. As the feeding devices of the recording machine are operated to advance the strip assembly, slack will immediately appear in the carbon strips thus removing the applied load. The motor accordingly will at once start running, turning the spindle 57 and taking up the slack in the carbon strip. As more and more carbon is wound on the spindle, the load upon the motor becomes greater and as the motor is stalled it cannot again start even though the tension upon the carbon strip is removed due to the increased amount of carbon on the spindle. There is accordingly connected in the motor operating circuit, by means of leads 63 and 64 a variable capacitor switch 65. By turning the indicator pointer 66 of the switch 65 the flow of current to the motor may be increased and the motor is again able to rotate the spindle. The pull of the motor will, of course, be great enough to turn the spindle when there is slack in the carbon strip but not great enough to tear the holes in the carbon when the motor is stalled due to the tension of the strip. There may be interposed in the electrical circuit an indicator or signal light 67 to give visual indication that the motor is running whereby to avoid a shutting down of operations with the stall motor left on. There is shown in Figs. 4 through 6 another embodiment of the invention, as regards application of rotary power to the winding roll or spindle. In this form of the invention a winding roll or spindle 68 is rotatably mounted between side frames 69 and 71 and directly driven from a motor 72 by means including a shaft 72' and bevel gears 73 and 74. The motor 72 is, in accordance with this form of the invention, intermittently operated in response to the forming of a slack loop in the carbon strip. Thus, side plates 75 and 76 are secured to the side frames 69 and 71 in opposing relation and each is formed with a vertically elongated slot 77. An idler roll 78 has its ends received and guided by the slots 77. Movable upward in the slots 77, the idler roll 78 is effective through a pivoted arm 79 to engage and open a normally closed micro switch 81 in the circuit (not shown) controlling energizing of the motor 72. The arm 79 normally is held down by a spring 82 upon a stop 83 in which position a nose portion 84 of the arm extends into the path of movement of the idler roll 78. At a lower extreme of motion, the idler roll 78 engages and closes a normally

open switch 85 which is in series relation with an electro magnet 86. Energizing of the electro magnet 86 serves through its plunger 87 to rock a latch member 88 in clockwise direction about its pivot 89 against the urging of a spring 91. The latch member 88 has a nose portion 92 extending into the area of slot 77 in aligned normally overlying relation to the nose 84 on the arm 79. The idler roll 78 extends in transverse overlying relation to the assembly of carbon strips immediately in advance of their reaching the spindle 68. The idler roll rests on the carbon strips and tends to form a loop therein in response to feeding of the carbon strips through and beyond the separator device.

When the motor 72 is running, the spindle 68 is turning, thus taking up the slack in the carbon strip. This causes the idler 78 to rise in the slots 77. Near the top of such slots, the idler contacts the nose 84 of arm 79, and continued upward motion of the idler forces the nose 84 past the nose 92 of latch 88 and into operating engagement with the switch 81. This normally closed switch thereby is open and the motor 72 is deenergized whereby to interrupt rotation of the spindle 68. As the arm 79 passes the latch 88, the latch drops back and assumes an underlying position with respect to the nose 84 of the arm and so holds the arm in an elevated position wherein the switch 81 is held open. Now, on the next succeeding advance of the record strip material through the separator device, the carbon strips become slack and the idler roll 78 drops downward in the slots 77, with the motor 72, however, contining to remain idle. As the idler roll reaches the bottom of the slots 77 it engages and closes the switch 85 with the result, as before mentioned, of rocking the latch 88 in a clockwise direction against the urging of spring 91. The arm 79 thereby is released and it is moved by spring 82 out of holding relation to the switch 81, whereupon this switch reassumes its normal closed position and the motor 72 begins again to operate taking up the slack in the strips C and starting another cycle of intermittent motor operation as before described. The plunger 87 of the electro magnet 85 has a slotted area 93 permitting rocking motion of the latch as it is by passed by the rising arm 79.

Referring to Fig. 7, there may advantageously be used in connection with any of the above described forms of the invention strip feeding means featuring dual feeding devices. Thus, in the recording machine is a platen shaft 94 on which are conventional pin feeding means 95 which positively engage the perforations 48 in the strip and advance it out of writing position and out of the recording machine to the booster roller 16. In accordance with the instant concept, however, there is mounted to the frame of the machine 11, side plates 96. A gear 97 is rotated by the platen shaft 94 and operates through a train of gears 98, 99 and 101 to turn a gear 102 on a transverse shaft 103, all supported on the frames 96. Mounted on the shaft 103 is a set of escalator type pin wheels 104. The pin wheel assemblies 95 and 104 are so regulated that both feed the same amount of strip material at the same speed. The escalator pin wheel, which may be like that disclosed in application Serial No. 175,962, now Patent No. 2,672,355, has a threefold purpose. Due to the manner in which the escalator type pin enters the hole in the forms it can be of a larger diameter. Therefore the pin engages a larger area of paper around the hole and there is less chance of the carbon tearing when the power driven carbon winding roll or spindle is winding the used carbon. Secondly, if there should be slight tear, the tear will occur at the escalator pin feed and not at the platen feed position, and the feeds may be so placed in this regard as to provide for a slight sag or slack in the strip between the dual feeding devices. This slack can be varied by loosening a set screw 105 by which the gear 102 is held on the shaft 103, and turning the shaft 103. This places the pins of the escalator pin wheels in a slightly forward or rearward position, thus producing a greater or lesser amount of slack. Thirdly, the escalator pin wheels help feed the strip up to the booster roller 16 and into the separator.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangment of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. Separator apparatus for manifold record strip material with interleaved carbon strips, including means for feeding said record strip material with carbon strips, an arrangement of chutes receiving the leading ends of individual record strips and carbon strips and separating said strips from one another, the chutes receiving said carbon strips having open exit ends, a single roller to which all carbon strips are wound in superposed relation to one another as they leave the exit ends of said chutes to establish tension thereon, and carbon strip controlled means connected to said roller, said carbon strip controlled means being independent of said feeding means and automatically operating in response to a predetermined tension in said carbon strips adjacent said roller to rotate said roller.

2. Separator apparatus according to claim 1, characterized in that said carbon strip controlled means includes a continuously energized electric motor and yieldable clutch means directly connecting said motor and said roller.

3. Separator apparatus for manifold record strip material with interleaved carbon strips, including rack means providing individual chutes for record strips and carbon strips, a single winding roll for connection to said carbon strips to establish tension thereon independently located beyond said chutes in relation to the direction of travel of the record strip material, means for feeding the record strip material with carbon strips into said chutes, and power means independent of said feeding means automatically for rotating said winding roll intermittently and in correspondence with the formation of a predetermined tension in said carbon strips between said feeding means and said winding roll.

4. Separator means according to claim 3, characterized in that said power means includes a low torque stall type electric motor continuously energized and in driving relation to said winding roll.

5. Separator means according to claim 4, characterized by a variable capacitor switch for controlling energizing of said motor.

6. Separator means according to claim 3, characterized in that said power means includes a continuously energized motor and a magnetic clutch between said motor and said winding roll.

7. Separator means for manifold record strip material with interleaved carbon strips, including a separator device for separating the carbon strips from the record strips, said carbon strips extending through and beyond said device, means for feeding the record material including the carbon strips through said device, a winding roll beyond said device on which the carbon strips are wound, an electric motor, driving connections from said motor to said roll for rotation thereof in response to operation of said motor, an idler roll resting on the carbon strips between said winding roll and said feeding means

and forming a loop in said strips in response to feeding thereof without corresponding rotation of said winding roll, said loop being removed by rotation of said winding roll without corresponding feeding of said carbon strips, the forming and removing of said loop effecting bodily raising and lowering of said idler roll, and switch means operated by said idler roll in its movements for controlling operation of said motor.

8. Separator means according to claim 7, characterized by a latch for holding said switch means in one position, said latch being enabled by a predetermined extent of movement of said idler roll in one direction and disabled by a predetermined extent of movement of the idler roll in the opposite direction.

9. Separator apparatus for manifold record strip material with interleaved carbon strips, including rack means providing individual chutes for record strips and carbon strips, a winding roll for said carbon strips to which the carbon strips are wound in superposed relation to one another establishing a tension thereon, said winding roll being located beyond said chutes in relation to the direction of travel of the record strip material, means for feeding the record strip material with carbon strips into said chutes, power means independent of said feeding means for rotating said winding roll intermittently and in correspondence with a predetermined tension in said carbon strips between said feeding means and said winding roll, said power means including an electric motor, a driving connection from said motor to said winding roll, means for controlling said motor, and an idler roll resting on said carbon strips in advance of said winding roll bodily movable by said strips in accordance with a predetermined tension thereon to operate said motor control means to selectively energize and deenergize said motor.

10. Separator apparatus for manifold record strip material with interleaved carbon strips, including means for feeding said record strip material with carbon strips, channel means receiving the individual record strips and carbon strips in a separated condition, a roller, the carbon strips being wound in superposed relation to one another to said roller to establish a tension thereon and means responsive to a predetermined tension in said carbon strips adjacent said roller for activating said roller including an independent motor.

11. Separator apparatus for manifold record strip material with interleaved carbon strips, including channel means for receiving record strip material with carbon strips from a recording machine at the exit end thereof for individually guiding said strips in separated condition, a single roller, said carbon strips being wound in superposed relation to one another to said single roller beyond said channel means establishing a tension thereon, drive means directly connected to said single roller and having means inter-related with said carbon strips for automatic energization and de-energization of said roller on predetermined tension occurring in said carbon strips beyond said channel means.

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