Aug. 10, 1937. J. L. SULLIVAN 2,089,308

RECORD MATERIAL TESTING MACHINE

Filed May 21, 1935 4 Sheets-Sheet 1

FIG. 2

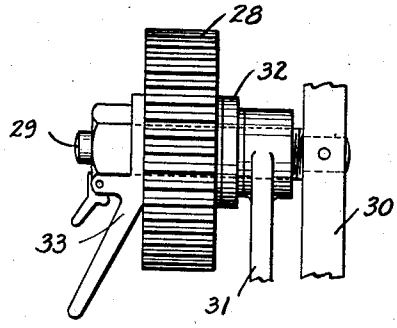


FIG. 1

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FIG. 3

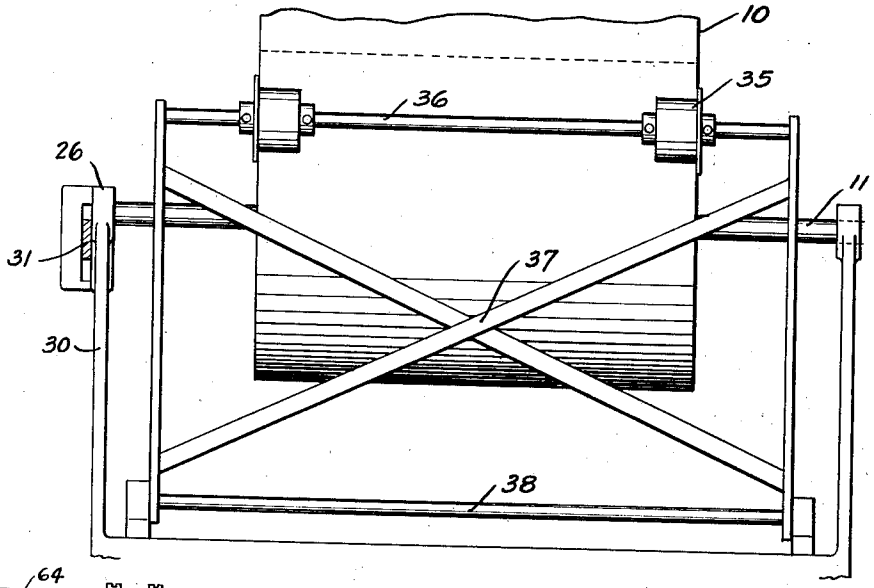
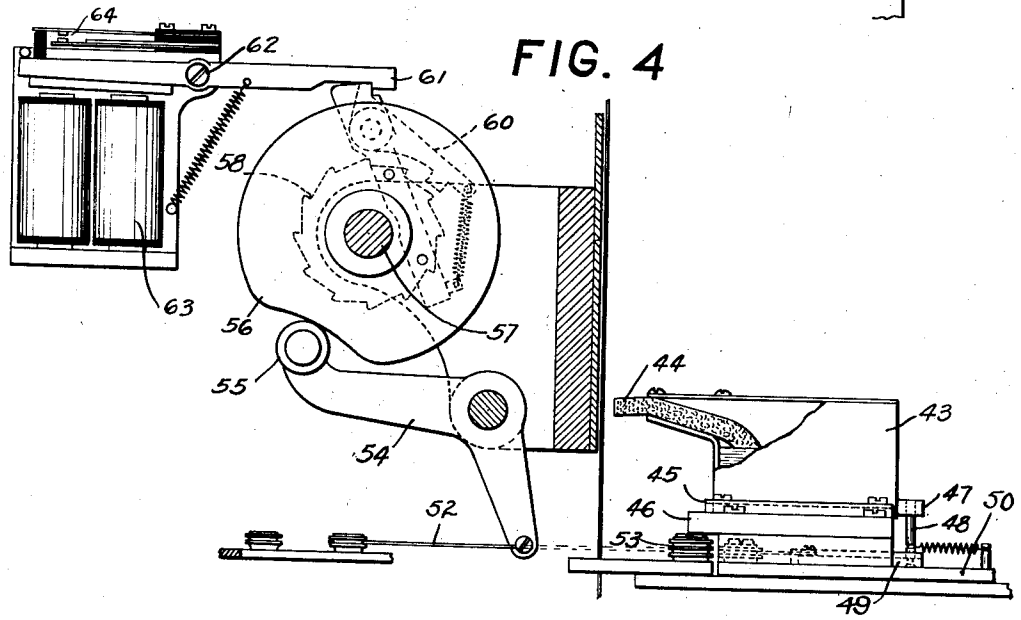


FIG. 4



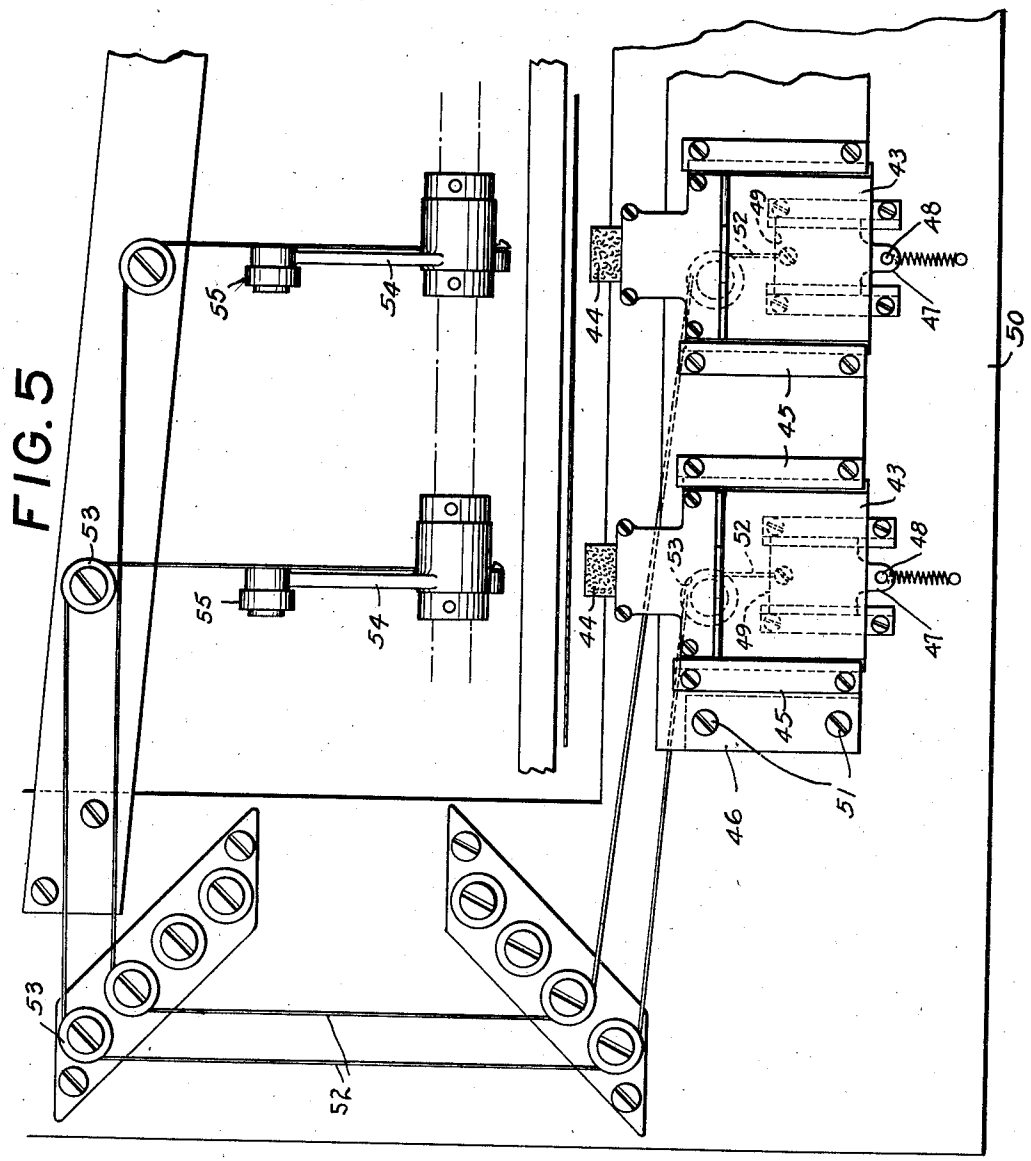
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FIG. 5



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FIG. 6

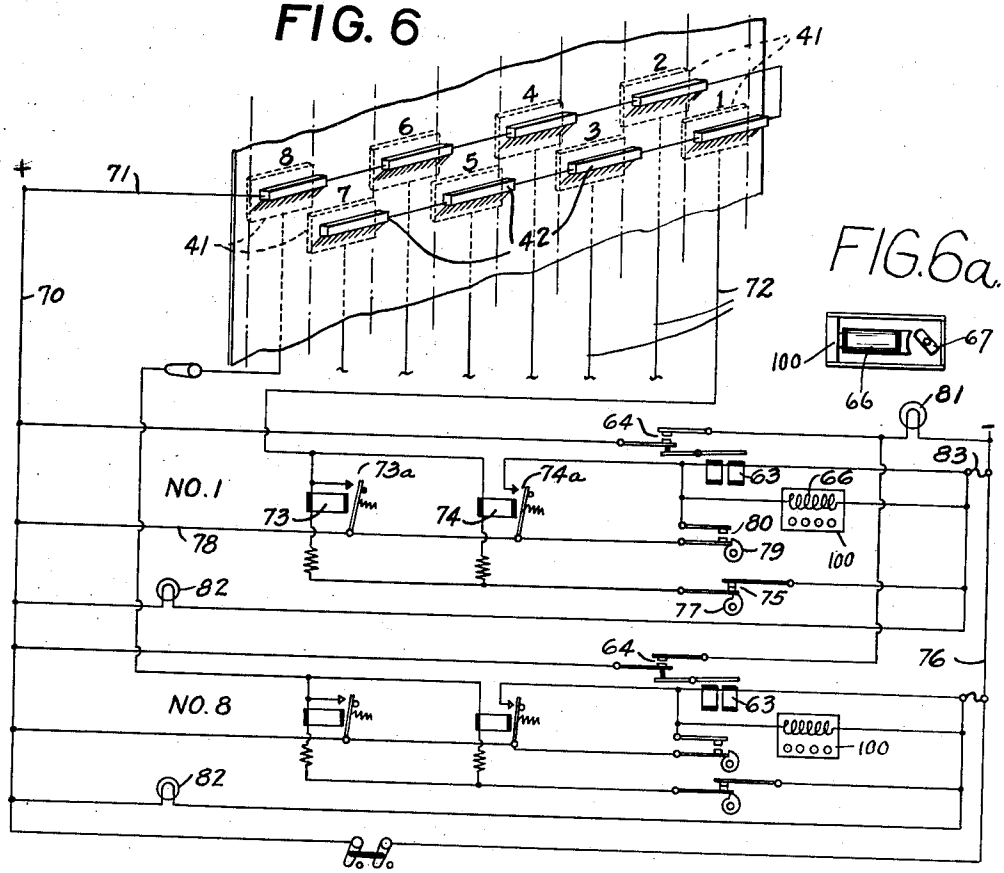
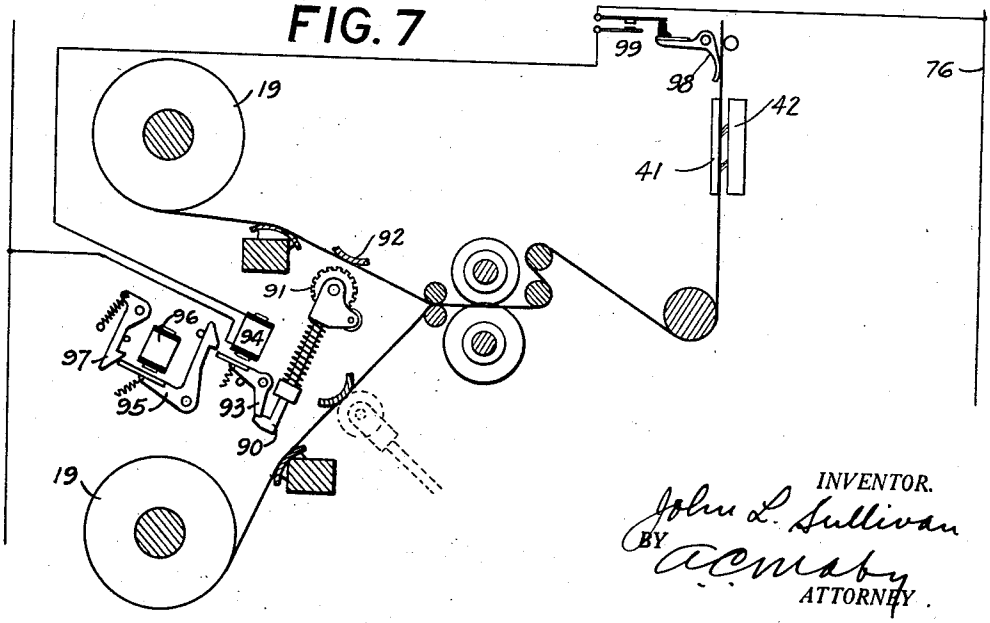


FIG. 6a.

FIG. 7



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Patented Aug. 10, 1937 2,089,308

UNITED STATES PATENT OFFICE

2,089,308

RECORD MATERIAL TESTING MACHINE

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Application May 21, 1935, Serial No. 22,664

6 Claims. (Cl. 177—311)

This invention relates to machines for analyzing record material to detect imperfections therein. Tabulating record cards, such as used in the well-known Hollerith type of accounting machines, are sensed by electric brushes which cause a circuit through differentially located punch-holes. The particular location of these holes controls the time of completion of the adding and printing circuits. The imperforate portion of the card acts as an insulator and permits completion of the register and circuits only through the punch-holes. Obviously apertures otherwise occurring in the card, for example, imperfections in the stock, may be in such a position as to permit a circuit to be completed elsewhere than through a punch-hole, or there may be imbedded in the card a bit of conducting material, such as carbon, which will permit the same result when encountered by an analyzing brush. In either case, one or more of the adding or printing devices may be operated to effect an erroneous recording.

The present invention provides means for analyzing the record material from which cards are to be made, before the material is cut into such cards. The card stock is generally provided in rolls of a width generally equal to seven or eight times the width of the tabulating card. This sheet of material is fed through a slitting machine and separated into rolls of the exact width of the record cards. As the sheet of material passes from the original roll to the slitting knives, sets of analyzing brushes, one for each strip into which the roll is to be divided, sense their respective portions of the sheet and if any one set encounters an imperfection such as will permit the completion of a circuit through the stock, it will cause the operation of a marking device of which there is one provided for each possible strip.

Each marking device has a wiping member which when moved against the record material as it passes through the machine will "stripe" a section of the material and this stripe will extend for a predetermined distance to either side of the point at which the imperfection is noted. After the wide roll of material has been divided into the rolls of lesser width, those of the latter, in which imperfections have been found, will contain one or more stripes indicating sections of the material which are unsuitable for machine control purposes. The final rolls are later placed in card presses of the type shown in Patent No. 1,563,014 issued to F. M. Carroll, November 24, 1925. In such machines the card stock is printed and cut into the required card lengths which are now the finished record cards. Among them, however, may be one or more record cards upon which there is to be found the "striping". Such cards are readily identifiable upon inspection and are removed from the remainder.

In the preparation of certain types of tabulating cards, especially cards that are to be used as negotiable instruments, the card presses serially number the record cards as they are printed and cut off from the roll. It is obvious that in such a group of cards the discarding of one or more because of the presence of imperfection-indicating striping will incur a gap in the sequence of the serial numbering. It is accordingly desirable that for this class of work rolls of strip material in which there are found no imperfections at all be used, and the present invention contemplates means operable by the imperfection-detecting devices for automatically labelling those rolls in which no imperfections are sensed.

A further object of this invention is to provide striping mechanism of improved form. The further object is to provide automatic means for maintaining a substantially uniform tension on the record material as it is fed through the machine.

A further object is to provide novel alining devices to control the travel of the record material.

Various other objects and advantages of the invention will be obvious from the following particular description of one form of mechanism embodying the invention or from an inspection of the accompanying drawings; and the invention also constitutes certain new and useful features of construction and combination of parts hereinafter set forth and claimed.

In the drawings:

Fig. 1 is a central section of the entire apparatus showing substantially the path of travel of the record material and the location of analyzing brushes, striping, and slitting devices.

Fig. 2 is a detail of the tensioning mechanism.

Fig. 3 is a section taken substantially along the lines 3—3 of Fig. 1 showing the card stock roller alining device.

Fig. 4 is an enlarged sectional detail of the marking device and its controlling mechanism.

Fig. 5 is a section taken substantially on the lines 5—5 of Fig. 1 showing the arrangement and manner of operation of the striping device.

Fig. 6 is a wiring diagram of the electrical circuits in the machine.

Fig. 6a is a detail of a counter actuating magnet.

Fig. 7 is a modified form showing the mecha-

nism for labelling the finished rolls after the material has been analyzed.

Feeding mechanism

In Fig. 1 the roll of card material 10, which is secured to rod 11, is placed in the supporting brackets of the frame in which the rod 11 and the roll 10 are axially movable. The web is then threaded around a series of fixed guide rollers 12 and a floating roller 13 which is suitably supported for vertical movement. The web is then guided past the sensing station generally designated A, thence past the striping station designated B, around fixed rollers 14, pulling rollers 15, and through the slitting station generally designated C to pair of rollers 16. From rollers 16 the separated alternate strips are guided over rollers 17 and 18 to form rolls 19. The rolls 19 are of a width equal to that of the record cards into which the strips are later to be divided in other machines.

Drive

20 is the main drive shaft of the machine and may be driven from any suitable source of power. The shaft 20 has gear connection 21 to shaft 22 from which gearing 23 drives the pulling rollers 15. Rollers 16 are also driven from shaft 22 through gearing 24. Shafts 17 and 18 are driven through gearing generally designated 21 and 25. As the rollers 15 draw the card stock from roll 10 around rollers 12, 13, and 14 the stock is "ironed" before it reaches the sensing station A.

Alining and tensioning mechanism

Secured to rod 11 is a gear 26 which meshes with an idler 27 which in turn meshes with the gear 28 (see also Fig. 2). Gear 28 is mounted upon a stud 29 secured in the frame 30 of the machine. Also threaded upon stud 29 is a brake arm 31 between which and gear 28 is a friction disk 32. The opposite face of gear 28 abuts an adjustable lock nut 33. If brake lever 31 is rotated in one direction it presses 28 against the lock nut 33 and tends to restrain the gear against rotation and consequently through gears 27 and 26 imposes a similar restraint upon roll 10. Conversely, if the brake lever is rocked in the opposite direction, the restraining influence is lessened. In Fig. 1 the free end of brake lever 31 is connected to one end of a link 34 whose other end is connected to the supporting arm of roller 13. If the card stock in its passage around rollers 12 slackens, rollers 13 will move downwardly to cause counterclockwise rotation of arm 31, which will serve to brake the roll 10 and consequent tightening of the web. As roll 13 rises, the movement of arm 31 in the opposite direction will have the opposite effect.

Referring now to Fig. 3, the edges of roll 10 are engaged by flanged rollers 35 adjustably secured upon rod 36 carried by a frame 37 pivoted on rod 38. The rollers 35 are held against roll 10 by means of a weight 39 (see Fig. 1) from which a wire 40, after passing over suitable guide pulleys, is connected to the frame 37. Frequently the roll 10 in handling becomes "telescoped" so that the card stock tends to have a slight axial movement as it unwinds.

The rollers 35 hold the web in rigid alinement as it leaves the roll and since rod 11 is axially movable in its bearings, the body of the roll itself will shift slightly to accommodate any unevenness and the card stock will commence to travel through the machine upon a fixed and definite path.

Sensing station

The sensing station A is diagrammatically represented at the upper part of Fig. 6 and comprises a plurality of staggered contact plates 41 insulated from one another and from the rest of the machine, there being one plate for each of the strips into which the web is to be slit. Cooperating with the plates 41 are sets of analyzing brushes 42 which are electrically connected to one another. The sets of brushes 42 are each slightly wider than the section of the card which constitutes the associated strip, so that an imperfection occurring along the line of slitting will be sensed by both overlapping sets of brushes and the two adjoining strips will accordingly be marked to denote the imperfection.

Striping mechanism

Referring to Figs. 4 and 5, there is provided a container 43 from each of which there extends one end of a felt wick 44 whose other end dips into the coloring material within the container. The container is slidably mounted in guides 45 secured to a plate 46 and each container has secured thereto a lug 47 provided with an opening which fits over a pin 48 secured in a secondary slide 49 which is suitably mounted in guides for horizontal reciprocation in plate 50.

Plate 46 is secured to plate 50 by means of screws 51 (see Fig. 5) upon the removal of which the plate 46 may be removed together with the containers thereon for refilling purposes and lugs 47 will lift from out of engagement with pins 48. Each slide 49 has connected thereto a wire cable 52 which is guided around pulleys 53 and has its opposite end connected to the depending arm of a cam follower 54. The cam roller 55 (Fig. 4) of follower 54, is adapted to cooperate with a cam 56 freely mounted on the shaft 57. Upon rotation of cam 56 the follower arm 54 will be rocked counterclockwise as viewed in Fig. 4 to draw upon cable 52 thus moving slide 49 toward the record material. Through the connection 47, 48 the container 43 will move therewith and wick 44 will be held against the material during the period that cam 56 holds the follower 54 in its rocked position. In this manner there is effected on the record material a colored stripe whose extent is determined by the configuration of cam 56.

The cam is automatically brought into operation upon detection of an imperfection in its related section of the web and the timing is such that wick 44 engages the record material at a point somewhat in advance of the location of the imperfection and remains in engagement for a predetermined period after the imperfection itself has passed the wick.

The shaft 57 is driven from rollers 15 (see Fig. 1) through a chain 59. Secured upon the shaft are clutch driving elements 58, which accordingly are in constant rotation while the machine is in operation.

Carried by each cam 56 is a spring-pressed pawl 60 which is normally engaged by a latching lever 61 pivoted at 62. A clutch magnet 63 when energized will rock lever 61 to release pawl 60 and cam 56 will accordingly rotate with shaft 57. The magnet 63 is deenergized during the cycle thus initiated and the restoring spring of lever 61 will return the latter to latching position to disengage 56 after a revolution has been com-

pleted. Lever 61 is provided with an extension which is adapted to close a pair of contacts 64 whose function will be explained in connection with the circuit diagram.

Slitting device

After the record material passes the striping station B it passes to the slitting station C where shearing disks or slitters 65 separate the web into the appropriate sections. In Fig. 6 there is indicated by dot and dash lines the sections into which the web may be separated and it will be observed that a narrow ribbon is cut from each edge of the web, so that the edges of each of the outer strips are clean cut. From the slitters the strips are now fed to the frictionally driven rolls 19.

Counters

For each of the strips into which the initial web is divided there is provided a counting device 100 of the magnetically operated type, each of which comprises an operating magnet 66 (Fig. 6a) which upon energization causes rocking of an armature 67 attached to the actuating shaft of the well-known type of Veedor counter.

Whenever an imperfection is detected on a strip, its associated counter magnet 66 is energized concurrently with the energization of the associated clutch magnet 63, so that finally each counter will record the number of imperfections detected in its strip. Those counters that have not been operated throughout the testing of a complete roll will serve as an indication that the related roll 19 is free of imperfections and accordingly suitable for the preparation of the more particular forms of record cards, such as bank checks mentioned above.

Circuit diagram

Referring now to the circuit diagram, Fig. 6, there are shown two clutch magnets 63 and associated contact devices which are controlled by two of the sections of the record material. It will be understood that further similar devices are provided for each of the other sections and their illustration has been omitted as being merely a repetition of the two sets of devices illustrated. The upper clutch magnet 63 shown in Fig. 6 is that associated with section 1 of the record material and upon detection therein of an imperfection a circuit will be completed from the left side of line 70, through wire 71, the set of brushes 42 which traverse section 1, the imperfection in the strip, contact plate 41, wire 72, relay magnets 73 and 74 in parallel, normally closed cam controlled contacts 75, to line 76. The controlling cam 77 of contacts 75 is integral with the cam 56 of Fig. 4. Energization of relay magnet 74 will close its contacts 74a, completing a circuit from line 70 through wire 78, contact 74a, clutch magnet 63, to line 76. The circuit also goes through counter magnet 66 in parallel with magnet 63, so that the count will be made concurrently with the drawing of the striping wick against the record material.

A further cam 79, also integral with cam 56 of Fig. 4, is adapted to close a pair of contacts 80 to complete a circuit from line 78, contacts 80, magnets 63 and 66, to line 76, and these magnets will remain energized until contacts 80 again open. The relay magnet 73 closes its contacts 73a to provide a holding circuit for relay magnet 74 to hold the circuit through magnets 63 and 66 until cam contacts 80 close. This holding circuit is traceable from wire 78, contact 73a, relay magnets 73 and 74 in parallel, contacts 75, to line 76. The timing is such that contacts 80 close before contacts 75 open to drop the holding circuit.

As pointed out above, energization of magnet 63 will also cause closing of contacts 64 which complete a circuit through a signal lamp 81 which lies in the common return line of the contacts 64, so that detection of an imperfection at any section of the web will cause illumination of this lamp to signal to the attendant that an imperfection is present. Prolonged illumination of this lamp serves as an indication that some serious defect is present in the web, in which case the machine may be stopped to determine the reason.

For each section there is provided a lamp 82 of low candle power whose function is to insure that the operating circuits of the detecting mechanism are in working order. The circuit for lamp 82 extends through the fuse 83 which if it should become overloaded and open the circuit, would result in the subsequent failure of its associated detecting circuits to respond to imperfections. Accordingly as long as lamps 82 continue to glow the attendant will know that the detecting circuits are in proper working order.

Modification

In Fig. 7 is diagrammatically shown a modified form of the invention whereby the rolls 19 in which no imperfections are found will be automatically marked to so indicate. Lying in the path of each of the separate strips is a spring-pressed plunger 90 having a printing wheel 91 at one end, which is adapted to press the strip against a plate 92. A spring-pressed armature latch 93 normally holds the wheel out of engagement with the strip and energization of magnet 94 will release the latch to prevent such engagement. A further armature latch 95 is provided which, when its operating magnet 96 is energized, will rock latch 95 into engagement with latch 93 to prevent the successful operation of the latter. A third latch 97 is provided to lock latch 95 in position if it is operated. The magnet 96 may be included in the circuit of Fig. 6 in place of counting magnet 66 or in parallel therewith if so desired. It will be thus apparent that upon sensing of any imperfection, magnet 96 will become energized and its armature latched in locking position, so that the printing wheel 91 associated with a particular strip cannot be operated. If no imperfections are found in a strip so that the related magnet 96 receives no energization during the analyzing of the web, magnet 94 may be energized as the trailing end of the web passes the analyzing station. This is brought about under control of a so-called card lever 98 which as long as the record material is passing the same will maintain a pair of contacts 99 in open position.

As the trailing end of the record material passes lever 98 contacts 99 will close causing the circuit to all of the magnets 94 in parallel and those which are not latched will trip their printing wheels to print on the trailing section of the strip some identifying designation—such as, "Free of imperfections" or the like—so that for special purposes the desired roll may be readily selected.

While there has been shown and described and pointed out the fundamental novel features of the invention as applied to two modifications,

it will be understood that various omissions and substitutions and changes in the form and details of the devices illustrated and in their operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention therefore to be limited only as indicated by the scope of the following claims.

What is claimed is as follows:

1. In a machine for testing non-conducting record material for imperfections which permit conduction through the material, means for feeding a web, means for slitting the same into strips, a plurality of sensing stations one for each strip of the web, a plurality of striping devices, one for each strip, and means controlled by each sensing station upon sensing an imperfection, for causing the corresponding striping device to effect a striping of predetermined length of a section of the related strip.

2. In a machine for testing non-conducting record material for imperfections which permit conduction through the material, means for feeding a web, a sensing station, a striping device comprising a liquid container and a wiper whose one end extends into said container and whose other end lies adjacent to said web, and means controlled by said sensing station upon sensing an imperfection, for sliding said container toward said web to engage said wiper therewith whereby a mark will be made on the web.

3. In a machine for testing record material for imperfections, means for feeding a web from a roll, means for slitting the same into strips and winding said strips to form rolls, means for sensing said strips for imperfections, means for labelling each strip roll and means controlled by said sensing means for preventing the operation of said labelling means with respect to strips in which imperfections are sensed.

4. In a machine of the class described, means for sensing a strip of record material for imperfections, means for winding said strip to form a roll, means for labelling the trailing end of said strip and means controlled by said sensing means for controlling the operation of said labelling means.

5. In a machine of the class described, means for feeding a web, means for slitting said web into strips and winding said strips to form separate rolls, means for testing each strip for imperfections and printing means controlled by said testing means for effecting an indication upon the rolls in which no imperfections are sensed.

6. In a machine of the class described, means for feeding a web, means for slitting said web into strips and winding said strips to form separate rolls, means for testing each strip for imperfections and printing means controlled by said testing means for distinguishing, by printing upon the rolls, those having imperfections from those having no imperfections therein.

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