Nov. 2, 1965 D. G. CECCHINI 3,215,271

MAIL SORTING MACHINE

Filed Nov. 20, 1962 3 Sheets-Sheet 1

FIG. 1

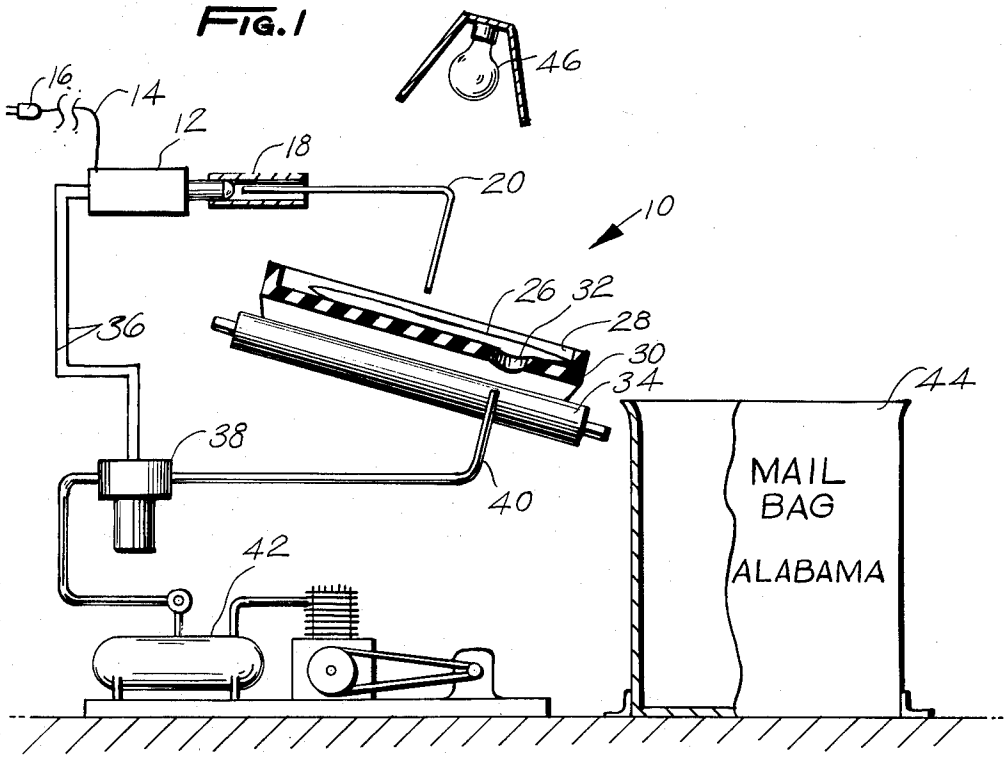
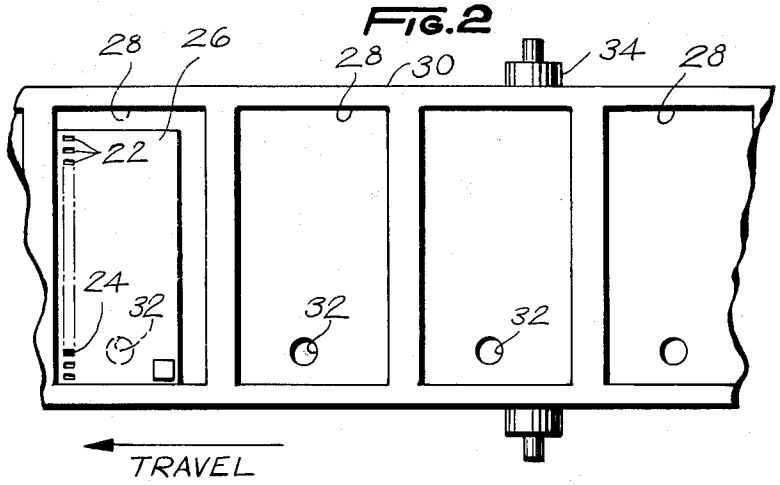



FIG. 2




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Nov. 2, 1965 D. G. CECCHINI 3,215,271

MAIL SORTING MACHINE

Filed Nov. 20, 1962 3 Sheets-Sheet 2

FIG. 3

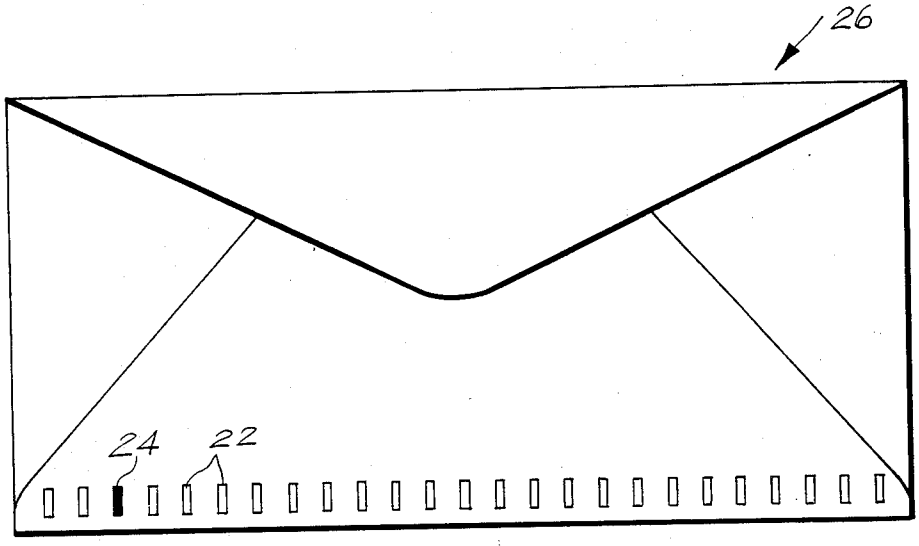
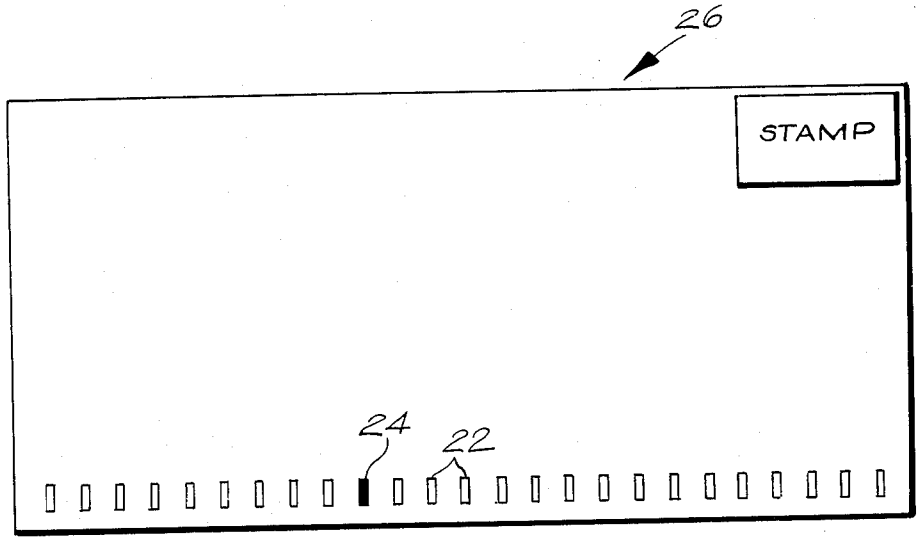



FIG. 4




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Nov. 2, 1965 D. G. CECCHINI 3,215,271

MAIL SORTING MACHINE

Filed Nov. 20, 1962 3 Sheets-Sheet 3

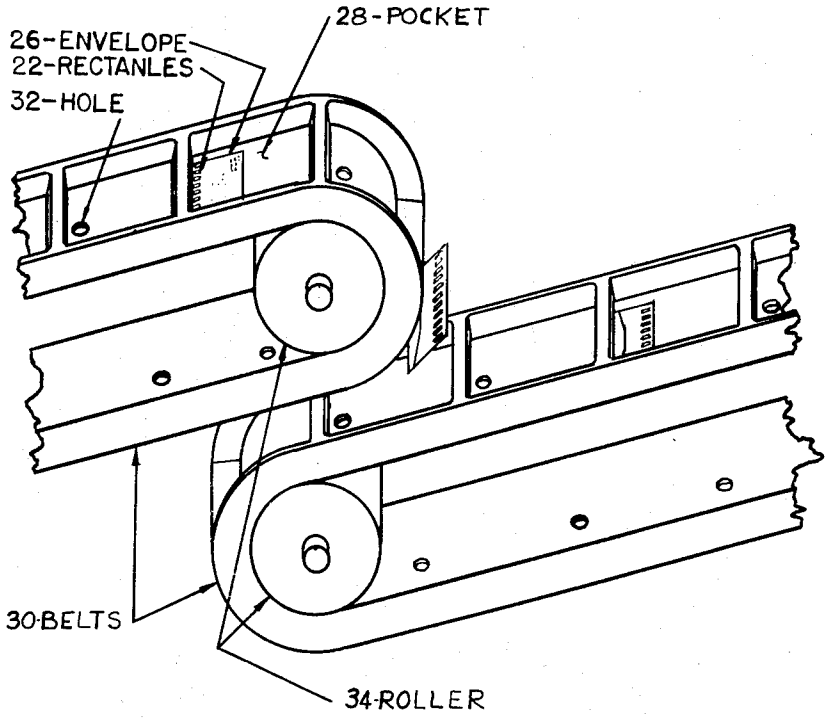



FIG 5

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1

3,215,271

# MAIL SORTING MACHINE

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8 Claims. (Cl. 209—111.7)

This invention relates to electronic sorting devices and more particularly to a mail sorting machine.

It is an object of the present invention to provide a mail sorting machine which will have a plurality of equally spaced apart photo electric cells which will sense a darkened embossed rectangle which will be one of a plurality of equally spaced apart embossed rectangles across the lower front face and rear face of an envelope.

Another object of the present invention is to provide a mail sorting machine which will sense the darkened rectangle imprinted upon the front face or rear face of an envelope and thus places into the proper bin by compressed air means actuated by the amplified signal from the photo electrical cell by solenoid and compressed air means directly beneath the envelope through an opening in the conveyor belt carrying a plurality of code marked letters.

A further object of the present invention is to provide a mail sorting machine which will have floodlight means over the conveyor belts which will prevent any shadow lines within the pockets carrying the letters of the conveyor belt, thus preventing a false signal. However, it is apparent that this shadow line can only generate at the letters' leading and trailing edges. Therefore, if the photo cell actuates the solenoid valve, the hole in the conveyor belt pocket will not be aligned with its vertical air pipe and the upsurging air will bounce harmlessly off the bottom of the belt.

Other objects of the invention are to provide a mail sorting machine bearing the above objects in mind which is of simple construction, has a minimum number of parts, is inexpensive to manufacture and efficient in operation.

For other objects and for a better understanding of the invention reference may be had to the following detailed description taken in conjunction with the accompanying drawing in which:

FIGURE 1 is an end view of a sorting machine comprising the present invention;

FIGURE 2 is a fragmentary top plan view of the belt shown in FIGURE 1;

FIGURE 3 is a rear view of the envelope shown in FIGURE 1;

FIGURE 4 is a front view of FIGURE 3; and

FIGURE 5 is a partial perspective view illustrating the plurality of belts.

Referring now more in detail to the drawing, a mail sorting machine **10** made in accordance with the present invention is shown to include a plurality of photo electrical cells **12** having an electric cord **14** with a plug **16** for receiving an electrical receptacle. Photo electric cells **12** are received within a right shield sleeve **18** of elongated configuration. A Lucite strip of angular and L-shaped configuration **20** is received within shield sleeve **18** and directs light through its rectangular cross section back to photo electric cell **12**. Lucite strip **20** is provided for scanning embossed rectangles **22** and the darkened rectangle **24** of envelope **26**. Envelopes **26** are freely received within pockets **28** of rectangular configuration of conveyor belt **30**. The conveyor belts **30** are molded of white flat finish reinforced rubber including the pockets thus giving the belts the required flexibility for going around rollers **34**. An opening of circular configuration **32** through each of the pockets **28** of belt **30** provide a means for air to be received beneath envelope **26** from an L-shaped pipette **40**. When a signal is received it is amplified and carried over wires **36** thus actuating normally closed solenoid valve **38** which opens and allows compressed air through pipette **40** which is directed through opening **32** thus lifting envelope **26**. Air is received on the inlet side of solenoid valve **38** from compressed air tank **42** which thus provides lifting means for envelope **26** so that it may slide over the edge of pocket **28** into bin **44**. Floodlight **46** positioned above belts **30** provides non-shadow effect thus preventing a false signal from being produced by the photo electric cells **12**.

2

In operation, the envelopes **26** will be embossed with fifty outlined vertical running rectangles. There are twenty-five on the front and twenty-five on the rear of the envelope and the rectangles are equally spaced across the width with a sizable space of white appearing between each rectangle **22**. The lines of rectangles **22** and **24** are positioned at the bottom edge of the envelope **26** and the rectangle's long length is determined by the time of the photo electric cell **12** and the speed of the conveyor belt **30**. The fifty photo electric cells **12** are arranged equally spaced apart above a canted two section conveyor belt **30** canted about its longitudinal axis approximately fifteen degrees and canted about its horizontal axis approximately fifteen degrees. The conveyor belt **30** has the pockets **28** shallow in depth and the envelopes **26** received therein are hopper fed, stamp up and stamp to the left. The cant in the belt **32** causes the letter **26** to position itself accurately by gravity in the corner of each pocket **28** and thereby aligns the rectangles **22** and **24** for scanning purposes by the photo electric cells **12**.

The photo electric cells are each poised above the belt **30** and are directly abreast of a pickup bin **44** which is located on the floor and on the downhill side which is horizontally canted of the conveyor belt **30**. Beneath the belt **30** and on the same lateral line with the photo electric cell **12** and its bin **44**, the pipette **40** of small diameter containing the compressed air will be directed upward toward the aligned opening **32** in the bottom of each pocket **28** in the passing conveyor belt **30**. The compressed air after being released by the normally closed solenoid valve **38** which is actuated by the signal of the photo electric cell **12**. There are fifty of the abovementioned arrangements, twenty-five on the stamp up belt and twenty-five on the stamp down belt. The openings **32** are through the downhill side of conveyor belt **30** and beneath the envelope **26**. The blackened rectangle **24** produces response in the photo electric cell **12** and the signal is then amplified to actuate the solenoid valve **38**. The energized solenoid valve **38** then allows low pressure compressed air to eject from the pipette **40** which is then aligned with the opening **32**. The upsurging air strikes the envelopes' lower face and raises the envelope edge over the wall against which it is resting by gravity. Upon being lifted over this wall, the envelope **26** falls off the downhill edge of the conveyor belt **30** and into its aligned pickup bin **44**.

It shall thus be recognized that the letter markings are standardized and unmarked envelopes must be handled conventionally.

It shall further be recognized that the conveyor belt **30** is actually two belts, one in elongation of the other and at a to be determined lower level for the following reason: The first belt, the stamp up belt, has twenty-five photo electric cells **12** arranged in echelon over the belt, adjusted to scan twenty-five different rectangles which are embossed on the stamp side of the envelope. If the first belt does not select the envelope, the envelope transfers to the second belt, inverting as it does so. The rear of the letter is also marked with twenty-five rectangles in the same manner as the front of the letter. The second belt operates identically as did the first belt, any unmarked envelopes, therefore unselected, falling into a container at the end of the second belt. All mail is addressed in the conventional manner but the addressor must, in addition, blacken in with pencil the rectangle applicable to the addressee. As may be realized by those familiar with the art, the speed of the conveyor belt and therefore the speed of the entire system is based upon the response time of the photo electric cell **12**. The long length of the rectangle to be determined by the response time of the photo electric cell **12**. It is apparent that the photo cell, after scanning its particular rectangle **24**, will also scan across the hand written address on the envelope. Therefore, the photo electric cell **12** must have a reduced sensitivity to the point where only when it scans a stretch of continuous solid color will it actuate its solenoid **38**.

It will be noted that the method of placing the mail upon the belt **30** may be accomplished by any of two ways, such as by the pneumatic arm as is used in the printing machine industry or by the other well known manner of using rubber rollers allowing one piece of mail to be separated from the pile at a time.

It shall be further noted that the afore-described sorting machine is capable of being used for either outgoing mail or incoming mail merely by designating route numbers, or state abbreviations to the rectangles **22**. It can be very easily adapted for use with incoming mail. In big cities, such as New York City, mail will be broken down to the zone first, then run through the machine for the route selection. In the case of outgoing mail, because of fifty separations, it will be necessary to set up terminals and distribution points and the development of elaborate distributing systems.

It shall further be noted that the conveyor belts **30** must be well flooded with light to prevent any shadow lines within the pocket **28** itself. Any shadow may cause a photo electric cell **12** to give a false signal. However, it is apparent that this shadow line can only generate at the letters' leading and trailing edges. Therefore, if the photo electric cell actuates the solenoid valve **38**, the opening **32** in the conveyor belt pocket **28** will not be aligned with its compressed air pipette **40** and the upsurging air will bounce harmlessly off the bottom of the belt **30**.

While various changes may be made in the detail construction it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States is:

**1.** A mail sorting machine comprising, in combination, a pair of continuous conveyor belts made of flat white rubber, a plurality of rectangularly configurated embossed markings on a plurality of letter envelopes carried by said belts, a plurality of rollers beneath said belts providing a means for transporting said belts, a plurality of photo electric cells with signal amplifying means spaced apart above said belts, a plurality of elongated sleeves providing shield means for said photo electric cells and a plurality of substantially L-shaped Lucite strips providing a means for scanning said rectangles on said envelopes and carrying reflected light to said photo electric cells, a plurality of normally closed solenoid valves, a plurality of pipettes secured to said solenoid valves providing a means for directing low pressure compressed air to remove said envelopes and lifting them over the edge of said belts and into a plurality of bins each aligned with a centering means, a compressed air motor and reservoir tank providing a means for a constant source of compressed air for ejecting said envelopes, a plurality of floodlights above said belt and sensing means providing a means for preventing shadows which may be giving false signals to said sensing device comprised of said photo electric cells.



**2.** A combination according to claim **1**, wherein said envelopes coded for assorting by said rectangles embossed upon the front and rear of said envelopes are received within substantially rectangular pockets which are equally spaced apart in said belts and said envelopes are embossed with vertically running rectangles, one of which is blacked in for sensing by said photo electric cells and said rectangles are in alignment with each other and equally spaced apart at the bottom edge of the front of said envelope and rear of said envelope.

**3.** A combination according to claim **2** wherein said photo electric cells arranged in echelon above said conveyor belts, said conveyor belts being canted about its horizontal axis substantially fifteen degrees and said pockets of said belt are substantially rectangular in configuration and freely receive said envelopes which are hopper fed stamp up and stamp to the left on one of said conveyor belts and said cant in said belt causes said envelope to position itself accurately by gravity means in the corner of each of said pockets and therefore aligns said rectangles for scanning by said photo electric cells.

**4.** A combination according to claim **3**, wherein said photo electric cells are poised above said belts directly abreast of a pickup bin which is located on the floor and on the downhill side of said conveyor belt and beneath said belt and on the same level line with said photo electric cell and its respective bin the substantially vertical end of said pipette directing said compressed air which will be directed upward toward a substantially circular opening in the bottom of each of said pockets in said passing conveyor belt, the compressed air being released by said solenoid valve actuated by the signal of said photo electric cell.

**5.** A combination according to claim **4**, wherein there are substantially an equal number of said Lucite strips, said pipettes, said solenoid valves, and said photo electric cells on the stamp up belt and on the stamp down belt and when a blackened rectangle on one of said envelopes of said letters is not scanned by the first belt it is ejected by said first belt to said second belt and reversed to its other side for scanning by a similar echelon of photo electric cells and said Lucite strips.

**6.** A combination according to claim **5**, wherein when said envelope blackened in an embossed rectangle produces a response in its respective photo electric cell said signal produced by said photo electric cell is then amplified to actuate said solenoid valve, thus the energized solenoid valve opens and releases air from said compressed air tank into said opening in the bottom of the pocket of said belt and the upsurging air thus strikes the envelopes' lower face and raises the envelope edge over the wall of said pocket against which it is resting by gravity and upon being lifted over said wall, said envelope falls off the downhill edge of said conveyor belt and into its aligned pickup bin.

**7.** A combination according to claim **6**, wherein all mail is addressed in the conventional manner, however, the addressor must, in addition, blacken in with pencil the rectangle applicable to the addressee and said conveyor belts are well flooded with said floodlights thus preventing any shadow lines within said pockets, preventing a false signal to be generated and if said shadow line is generated at the letter's leading or trailing edge, said photo electric cell actuates said solenoid valve and said opening in said

conveyor belt pocket will not be in alignment with its respective compressed air receiving pipette and thus the upsurging air produced by said solenoid valve will bounce harmlessly off the bottom of said belt.

8. A combination according to claim 7, wherein said rectangular coding of said envelopes comprises a means for sorting either outgoing or incoming mail by designating route numbers or state abbreviations to said rectangles and when in use in large cities said mail will be broken down to zones first and then run through said mail sorting machine for route selection and the speed of said conveyor belt and the speed of the entire system is based upon response time of said photo electric cells, the long length of said rectangles embossed upon said envelopes determining the response time of said photo electric cells sensing said rectangle and said photo electric cell will have a reduced sensitivity to such a point where only when it scans a stretch of continuous solid color will it actuate its solenoid valve, that when said device scans across the handwritten address on said envelope a false signal will not be generated.



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