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Kulik et al.

[11] **3,893,022**

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[54] **SEALED ENVELOPE EXAMINING DEVICE FOR DETECTING THE PRESENCE OF METAL**

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[52] **U.S. Cl.** **324/41**

[51] **Int. Cl.** **G01r 33/00**

[58] **Field of Search** 324/41

[56] **References Cited**

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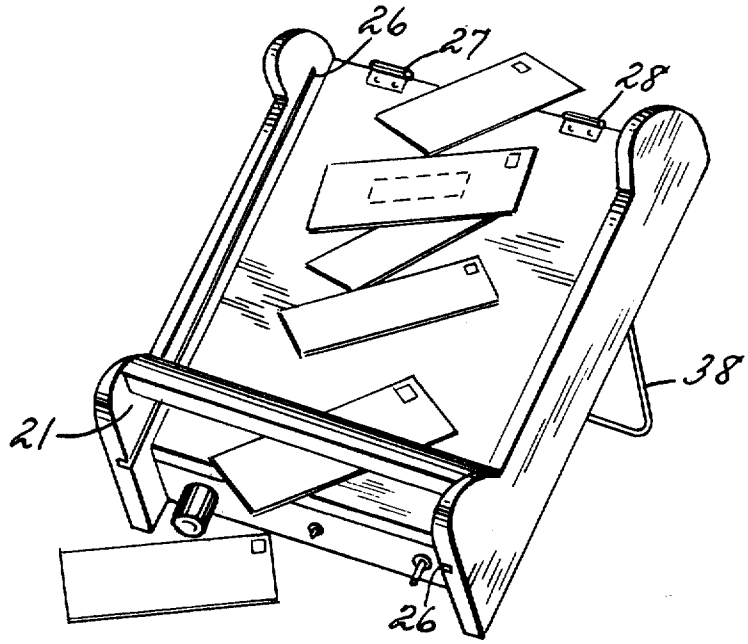
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Primary Examiner—Robert J. Corcoran
Attorney, Agent, or Firm—Charles E. Temko

[57] **ABSTRACT**

A device for detecting the presence of metal in sealed flat envelopes, whereby the presence of "letter bombs" and similar destructive devices can be sensed and an alarm device actuated. The device includes a base of generally rectangular configuration containing a detecting circuit including a pair of coils, one of said coils being mounted within said base, and the other said coil supported on a bridge-like structure extending transversely above said base to define an interstice through which envelopes pass. The presence of metal changes the electromagnetic field existing between the coils, resulting in a change in impedance sufficient to actuate the alarm.

2 Claims, 7 Drawing Figures



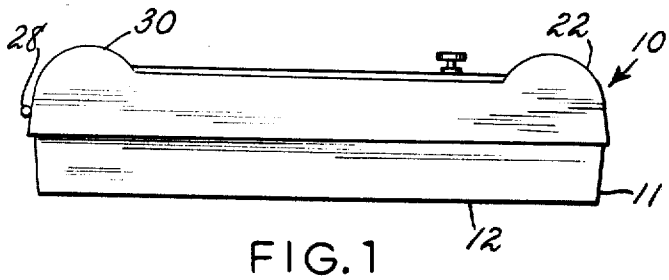


FIG. 1

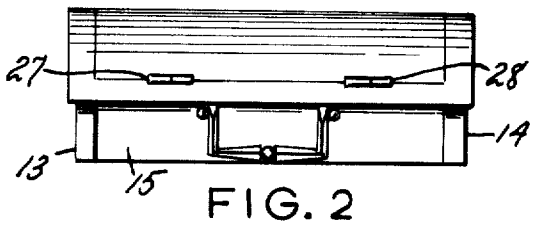


FIG. 2

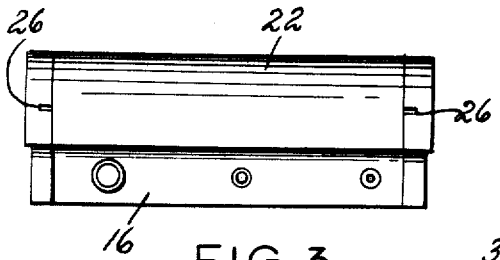


FIG. 3

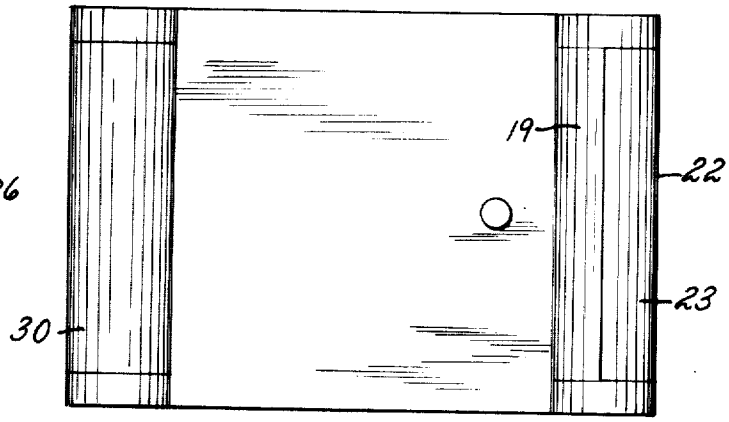


FIG. 4

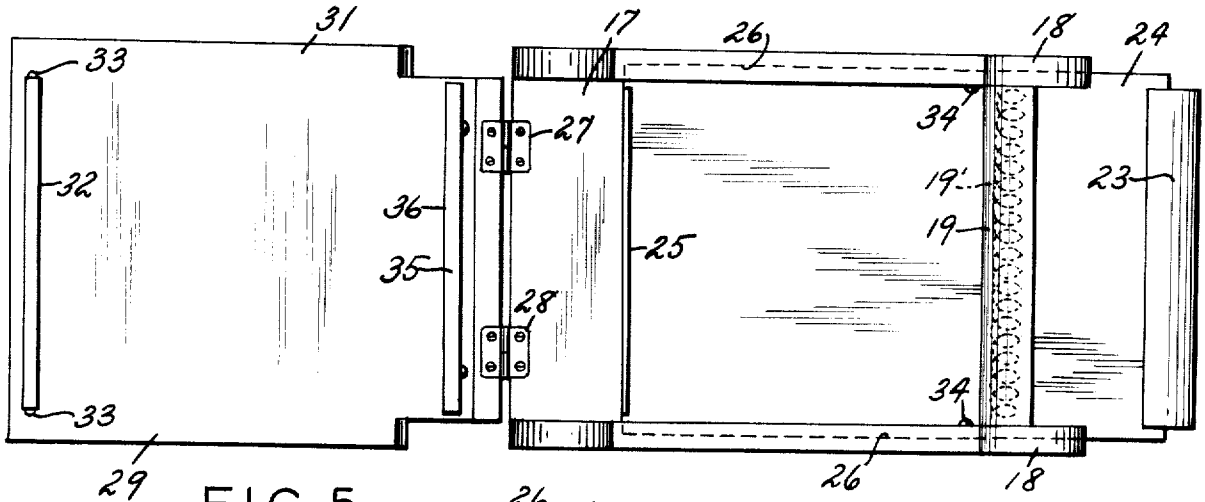


FIG. 5

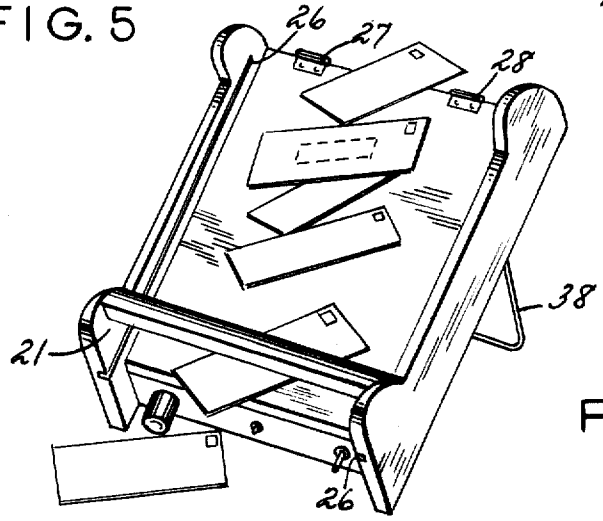


FIG. 6

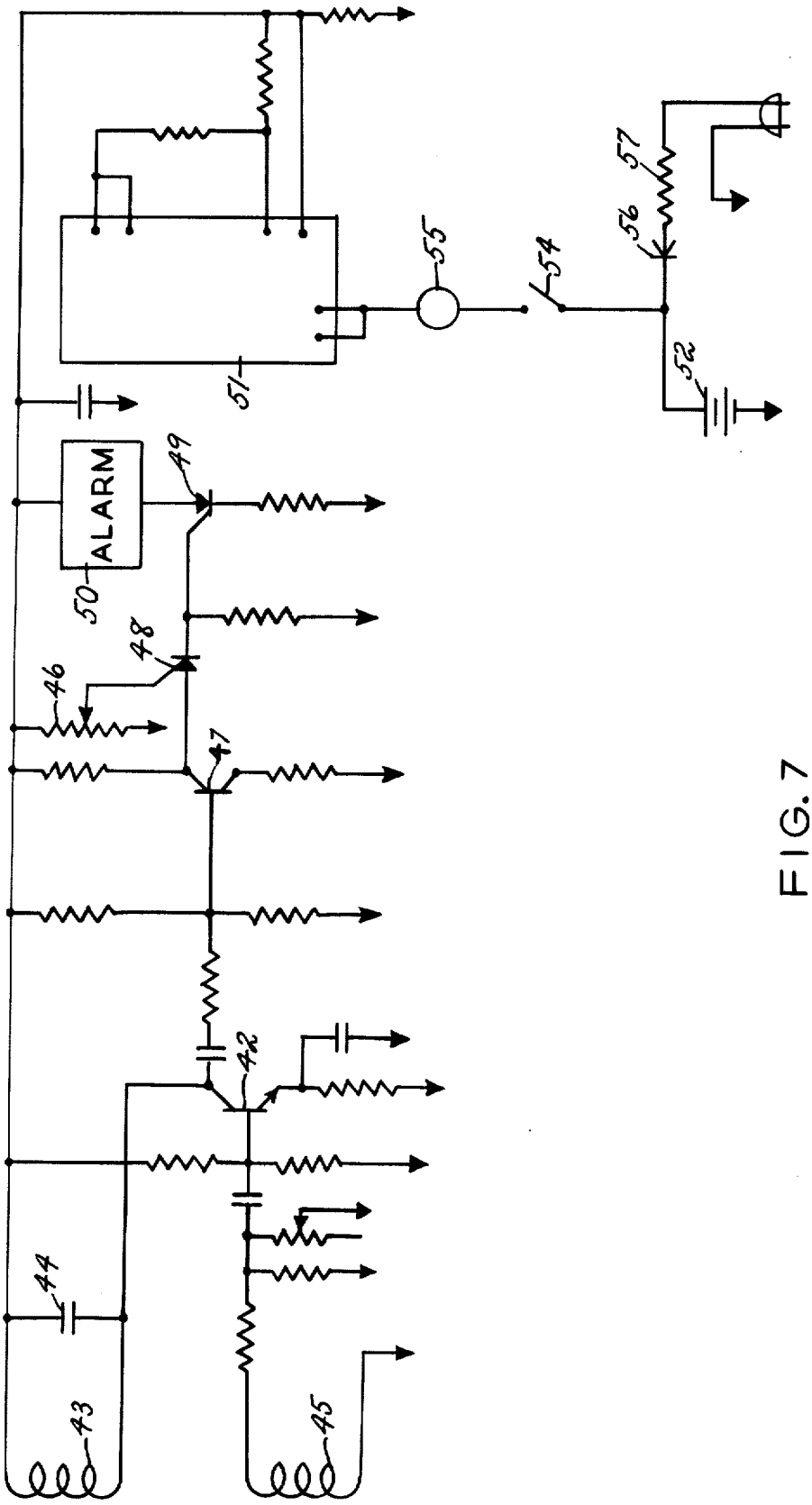


FIG. 7

SEALED ENVELOPE EXAMINING DEVICE FOR DETECTING THE PRESENCE OF METAL

BACKGROUND OF THE INVENTION

Metal detecting devices are per se known in the art, and have been used extensively in the detection of land mines and similar buried metallic objects. More recently, devices have been used at air terminals for the examination of passenger baggage and freight. Such devices generate a relatively wide electro-magnetic field, and are not optimized for detecting relatively small metallic articles or devices used in the construction of so-called "letter bombs," neither are they physically convenient to use for this function. They may also be unsafe to use because of excessive field power.

With wide use of such destructive devices sent through postal channels, there has arisen a need for a simple device through which letters and envelopes may be passed at high speed for the purpose of metallic detection. Many letter bombs are formed from flattened cartridge cases in conjunction with spring wire, and the total metallic content of a single device is relatively small. Other types are electrically operated and use metallic parts such as batteries, wires, foil, switches and detonators.

BRIEF DESCRIPTION OF THE PRESENT INVENTION

Briefly stated, the invention contemplates the provision of a letter box size detector comprising a generally rectangular base enclosing a detector circuit and a first coil forming a part thereof. A transversely extending bridge is supported by said base and encloses a second coil forming a part of the detector circuit, the bridge defining with the base an interstice between which letters and envelopes are serially passed. The letters are placed upon a sliding drawer and move horizontally beneath the bridge, or in the case of a large number of letters, the base may be tilted to form an inclined plane, and the letters allowed to fall under the action of gravity through the interstice. To maintain privacy, a pivotally mounted cover selectively overlies the drawer, and such position, the cover locks the drawer against withdrawal.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings, to which reference will be made in the specification, similar reference characters have been employed to designate corresponding parts throughout the several views.

FIG. 1 is a side elevational view of an embodiment of the invention.

FIG. 2 is a first end elevational view thereof.

FIG. 3 is a second end elevational view thereof.

FIG. 4 is a top plan view thereof.

FIG. 5 is a second top plan view with cover and drawer elements in opened condition.

FIG. 6 is a view in perspective of the embodiment with cover and drawer elements removed, and the base supported at an angle wherein an upper surface thereof forms an inclined plane.

FIG. 7 is a schematic wiring diagram of the detector circuit forming a component of the embodiment.

DETAILED DESCRIPTION OF THE DISCLOSED EMBODIMENT

In accordance with the invention, the device, generally indicated by reference character **10** includes a base element **11** of generally rectangular configuration and comprising a lower wall **12**, side walls **13** and **14**, end walls **15** and **16** and an upper wall **17**. Extensions **18** on the side walls **13** and **14** support a hollow bridge **19** supporting in concealed relation a first coil **19'** (see FIG. 4) immediately above a second coil not shown) disposed in the base element **11**, the bridge **19** forming with the upper surface of the upper wall **17** a transversely extending space **21** through which letters or envelopes being examined may pass.

Slidably mounted between the side walls **13** and **14** is a drawer element **22**, the element **22** including an outer end wall **23**, a bottom wall **24** and an inner end wall **25**. The longitudinal edges of the bottom wall **24** ride in guiding grooves **26** (see FIGS. 5 and 6) so that the lower surface thereof is free of contact with the upper surface of the wall **17** during movement.

Supported by hinge means **27** and **28** is a pivotally mounted cover element **29** including a curved end wall **30**, a planar main wall **31** and a first transverse member **32** having detent means **33** at each end resiliently engageable in corresponding recesses **34** in the side walls **13** and **14**. A second transverse member **35** includes a surface **36** adapted to engage an inwardly disposed wall of the inner end wall **25**, and maintain it in the position shown in FIG. **4**.

The device may be operated in either of two manners, depending upon the quantity of letters and envelopes to be examined. In one method, the cover element **29** is swung open as shown in FIG. **5**, and one or more letters are placed on the upper surface of the wall **24**. After activating the detector circuit, the drawer is withdrawn as shown in FIG. **5**, causing the envelopes to pass beneath the bridge **19**, the presence of metal being thereby detected.

Where a relatively large number of pieces of mail are to be examined, the drawer element **22** and cover element **29** are removed, and the base element **11** is propped using a selectively engageable wire frame member **38** to the position shown in FIG. **6**. Pieces of mail are merely dropped on the inclined upper surface of the upper wall **18** to fall under the action of gravity beneath the bridge **19** effecting a similar result.

Referring to FIG. 7 in the drawings, there is illustrated a transistorized circuit suitable for use in the disclosed embodiment, it being understood by those skilled in the art that other circuits of well known type may be substituted where desired.

Referring to FIG. **7**, transistor **42** is an oscillator with a tuned circuit consisting of coil **43** and a 0.015 capacitor **44** operating at a frequency of approximately 20 KHz. Feedback is provided by coil **45**.

When a metallic object is inserted between coil **43** and coil **45**, the feedback is disturbed and the level of the oscillator decreases. The sensitivity of the circuit is adjusted by means of a 5K reheostat **46**.

The output of the oscillator **42** is amplified and detected by transistor **47**. The level at the collector of transistor **47** is compared with the level of the 5K reheostat **46** setting. When the anode of transistor **48** rises 0.3 volt above the potentiometer setting, transistor **48** conducts and triggers a silicon controlled rectifier **49** which, when conducting, causes the alarm **50** to sound.

Integrated circuit **51** is a voltage regulator which provides a stable voltage. The power supply **52** is a battery

of two 9 volt rechargeable batteries. When the switch **54** is in the "on" position, a light emitting diode **55** illuminates. The power supply **52** is recharged by interconnection with a **117** volt ac power source. A diode **56** rectifies the current to dc through a 4.7K resistor **57.**

It will be observed that during operation, on the occurrence of a detecting action as a metallic object passes between the coils, the electromagnetic field existing therebetween collapses, thereby minimizing the possibility of an electrical force discharging an explosive device.

We wish it to be understood that we do not consider the invention limited to the precise details of structure shown and set forth in this specification, for obvious modifications will occur to those skilled in the art to which the invention pertains.

We claim:

1. A sealed envelope examining device comprising: a base element forming a housing, a metal-sensitive oscillating detector circuit at least partially disposed within said housing, said circuit including first and second

coils developing an electromagnetic field therebetween and an alarm device; said base element including a planar upper wall and a pair of side walls on either side thereof, a bridge structure supported by portions of said walls and extending over said upper wall to define an interstice therebetween for the passage of an envelope therethrough, one of said coils being supported by said bridge structure, the other of said coils being supported by said base element on opposite sides of said interstice; a slideable drawer element supported by said base element and passing beneath said bridge structure, and a pivotally mounted cover element selectively overlying said base element and having means maintaining said drawer element against movement when said cover element is in overlying position.

2. Structure in accordance with claim **1,** including means for mounting said upper wall of said base element at an angle relative to horizontal, whereby envelopes placed upon said upper wall may slide under the force of gravity through said interstice.

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