

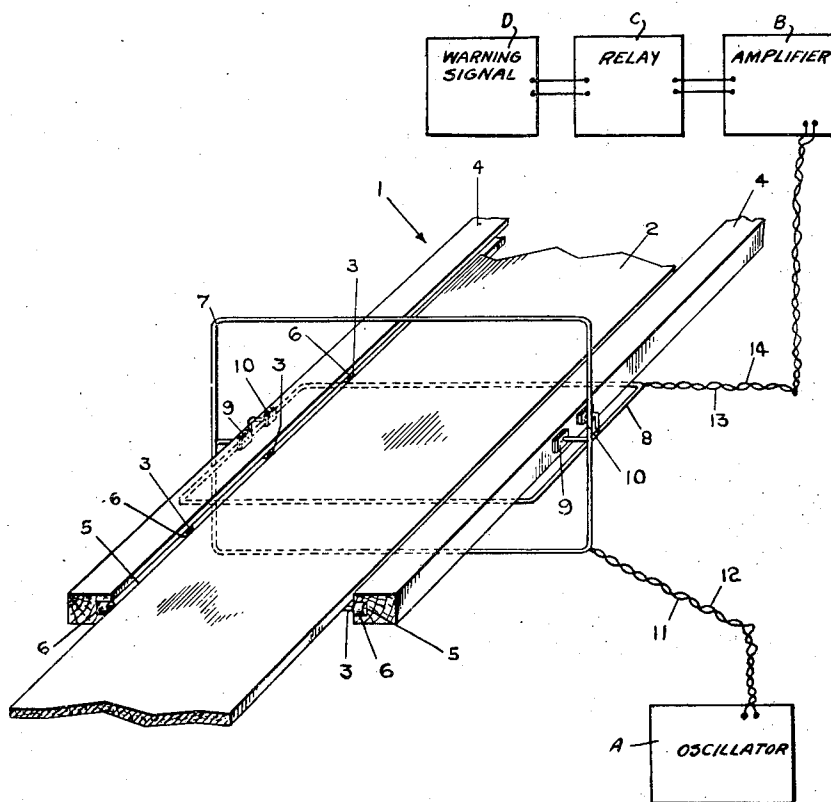
July 26, 1949.

C. B. GRADY, JR

2,477,057

APPARATUS FOR DETECTING METAL PARTICLES

Filed Jan. 11, 1946



INVENTOR.

CHARLES B. GRADY, JR.

BY

*Sheltzer and Livingston*  
ATTORNEYS.

## UNITED STATES PATENT OFFICE

2,477,057

## APPARATUS FOR DETECTING METAL PARTICLES

Charles B. Grady, Jr., West Orange, N. J., assignor  
to Celanese Corporation of America, a corporation  
of Delaware

Application January 11, 1946, Serial No. 640,615

2 Claims. (Cl. 175-183)

1

This invention relates to a novel detecting device, and relates more particularly to an improved device for the detection of stray metal bodies in a moving mass of non-metallic material in particle form.

An object of this invention is to provide a novel detecting device to be employed in connection with a belt conveyor system, or the like, carrying certain fibrous materials, whereby the presence of metal bodies in said fibrous materials may be readily determined and indicated by suitable means.

Other objects of this invention will appear from the following detailed description and the accompanying drawing.

In the drawing, the figure is a perspective view, partly broken away, showing a portion of a belt conveying system having in combination therewith and attached thereto the novel detecting device of my invention.

Referring now to the figure of the drawing, the belt conveying system, which is generally indicated by reference numeral 1, comprises as the main element a flexible belt 2 having a plurality of metal supporting rods 3 fixed in the supporting rails 4 at spaced intervals along slots 5 in said rails. The rods 3 are set in roller bearings 6 and provide the desired degree of lateral support for said belt 2. The rods 3 and the bearings 6 are stationary. The supporting rails 4 are set upon or supported by suitable framework (not shown), the path of the conveyor belt 2 being defined by the direction and angle at which the supporting rails 4 are placed. The belt 2 is driven by suitable driving means (not shown) and the roller bearings 6 serve to minimize any friction which may develop as said belt moves.

The conveyor belt 2 may be employed to transport any wet or dry material in particle form from point to point. In accordance with this invention, means are provided to detect the presence of stray metal bodies in the material moving on belt 2, said means comprising a pair of coils 7 and 8. The coil 7 is attached to rails 4 by insulated blocks 9 and in a plane at right angles to belt 2 while the coil 8 is parallel to the direction of movement of said belt 2 and is attached to the rails 4 by insulated blocks 10. The coil 7 is attached to a suitable oscillator A by means of leads 11 and 12 which oscillator may be adjusted to operate at either audio or radio frequency. The coil 8 is attached through a pair of leads 13 and 14 to an amplifier B having two, three or more amplification stages, the last amplification stage of which being biased slightly beyond 55

2

cut-off. Normally, the coil 8 will pick up no energy from the coil 7 due to the angular displacement of the field of the coil 7 from the coil 8. When a piece of stray metal enters the field of coil 7, however, the field is distorted and the coil 8 thereupon picks up some energy from the resulting distortion of the field. By a suitable amplification of the energy flowing through coil 8 in the several amplification stages, the resulting energy in the last stage is then caused to operate a switch or relay C and thus to flash a suitable warning signal D, or to stop the conveyor automatically or divert that portion of the material containing the foreign body from the main body in any suitable manner. The removal of the stray metal in the material on belt 2 is thus accomplished before the metal body can injure any machinery to which said material is being fed.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of my invention.

Having described my invention, what I desire to secure by Letters Patent is:

1. In a conveying system, the combination of a conveyor belt normally carrying a non-metallic material in particle form thereon and a pair of substantially flat coils associated therewith, one of said coils being horizontal to and substantially within the plane of said conveyor belt and the second being in a plane perpendicular to the direction of movement of and surrounding said conveyor belt so that the axes of said coils are at right angles to each other and intersect in the plane of said belt, the first-named coil being connected to an amplifier and the last-named coil being connected to a high frequency oscillator, whereby any distortion of the field of the energized coil due to the presence of metal bodies in the material on the conveyor belt causes energy to be picked up by the first-named coil and fed into the amplifier to be amplified and converted into a desired signal or impulse.

2. In a conveying system, the combination of a conveyor belt supported on rotatable metal rods and normally carrying a non-metallic material in particle form thereon and a pair of substantially flat coils associated therewith, one of said coils being horizontal to and substantially within the plane of said conveyor belt and the second being in a plane perpendicular to the direction of movement of and surrounding said belt so

that the axes of said coils are at right angles to each other and intersect in the plane of said belt, the first-named coil being connected to an amplifier and the last-named coil being connected to a high frequency oscillator, whereby any distortion of the field of the energized coil due to the presence of metal bodies in the material on the belt causes energy to be picked up by the first-named coil and fed into the amplifier to be amplified and converted into a desired signal or impulse.

CHARLES B. GRADY, JR.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name        | Date          |
|-----------|-------------|---------------|
| 1,640,524 | Augustine   | Aug. 30, 1927 |
| 1,812,392 | Zuschlag    | June 30, 1931 |
| 2,228,294 | Wurzbach    | Jan. 14, 1941 |
| 2,237,254 | Broekhuysen | Apr. 1, 1941  |

#### OTHER REFERENCES

Dept. of the Interior, Bureau of Mines Information Circular 6854, dated October 1935, pages 12 and 13 and Figs. 14 and 15.