Oct. 7, 1958 W. R. JASPERSON 2,855,150

COUNTING DEVICE

Filed April 13, 1955

FIG. 1.

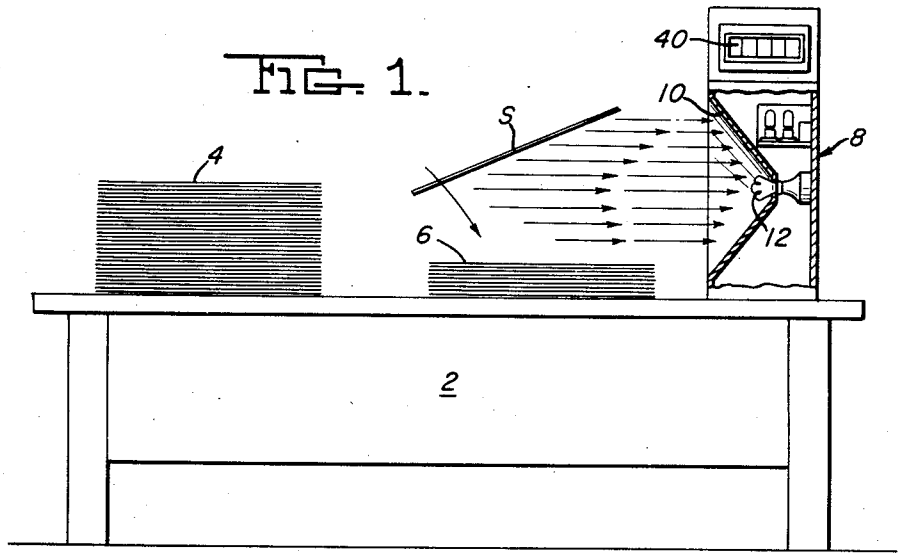



FIG. 2.

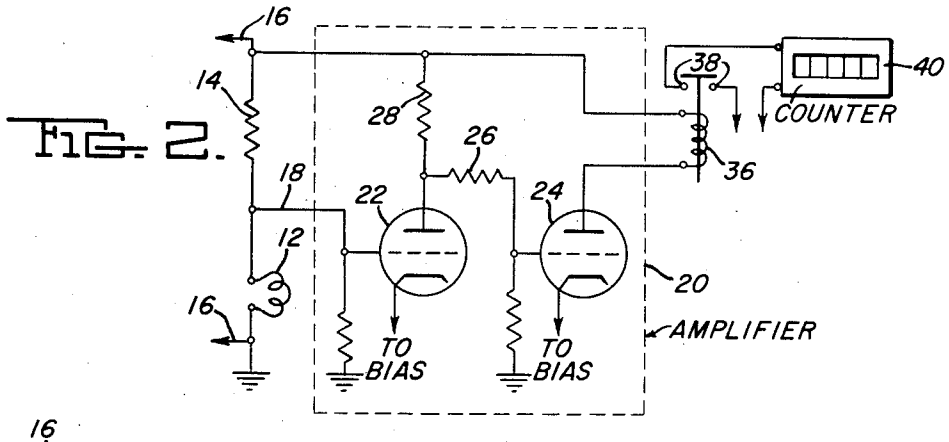
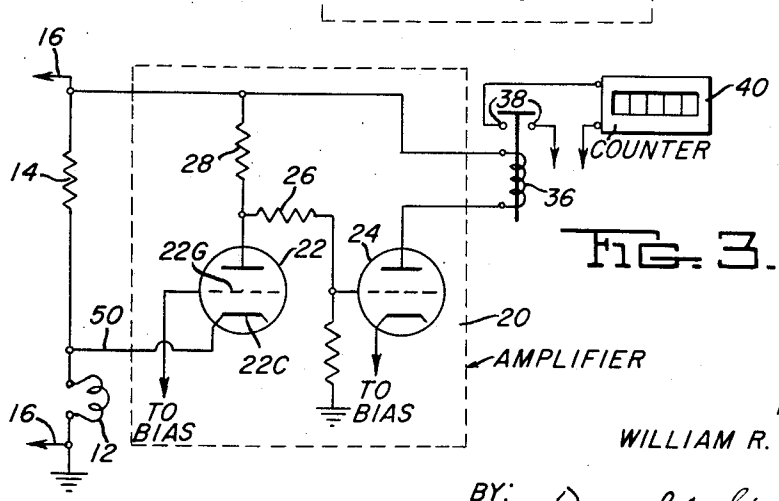



FIG. 3.




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# COUNTING DEVICE

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8 Claims. (Cl. 235—98)

This invention relates to a counting device particularly adapted for counting sheets and plates as they are piled one on top of the other and is a continuation-in-part of my co-pending application Serial No. 360,655, filed June 10, 1953, now abandoned. One such device is shown in the patent to Mulquin No. 2,482,201, dated September 20, 1949, in which puffs of air are occasioned by the turning over of sheets as they are moved from one pile to the other. The device shown therein depends upon the air puff to move mechanical means and in some instances the puff is not sufficiently strong to accomplish this purpose, especially when the parts of the device are not well lubricated. Also, the device requires the use of quite a few moving parts which are subject to damage and/or corrosion.

It is an object of my invention to provide a counting device which is actuated by the puff of air created when an article is moved and which does not depend upon moving parts for actuating the counter.

This and other objects will be more apparent after referring to the following specification and attached drawings, in which:

Figure 1 is a schematic elevation of my device;

Figure 2 is a schematic wiring diagram of one particular circuit which may be used with my device; and

Figure 3 is a schematic wiring diagram, similar to Figure 2, showing a modified and preferred circuit.

Referring more particularly to the drawings, reference numeral **2** indicates a table having a pile of sheets **4** thereon. The inspector inspects the sheets S one at a time by turning them over and piling them on a second pile **6**. A counting box **8** is mounted on the table **2** adjacent the pile **6** and is provided with a funnel **10** having its large end facing the pile of sheets **6**. A filamentary resistor **12** is mounted in the bottom or apex of the funnel **10**. This filamentary resistor **12** is connected in series with a limiting resistor **14** across a voltage source **16**. The resistance of the resistor **14** is substantially greater than that of resistor **12** and the voltage supply **16** causes sufficient current to flow through the resistor **12** to heat it above atmospheric temperature. In practice the resistance of resistor **12** is only a small percentage of the resistance of resistor **14**. A circuit **18** is connected across the filamentary resistor **12** and includes an amplifier **20** which may be of any standard type. As shown, the circuit includes two tubes **22** and **24**. The grid of tube **24** is connected to the anode of tube **22** by means of a resistor **26**. The anode of tube **22** is connected to the voltage source **16** through a resistor **28**. The anode of tube **24** is connected to the voltage source **16** through the coil of a relay **36**. It will be understood that other types of amplifiers may be used in place of that shown and that the output therefrom will be connected to the coil of relay **36**. When the coil of relay **36** is energized its contacts **38** close completing a circuit to a counter **40**.

The operation of the device is as follows.

When a sheet S is turned and dropped on pile **6** a puff of air is created which is directed by means of the funnel **10** against the resistor **12**, thus cooling the resistor momentarily. This cooling reduces the resistance of resistor **12** and consequently reduces the IR drop across it. The current in this circuit remains substantially constant since the reduction of resistance in the filamentary resistor **12** is but a minute fraction of the total resistance in the circuit. The dip in IR drop across the resistor **12** creates a voltage pulse which is delivered by the circuit **18** to the amplifier **20** where the value thereof is amplified. The amplified output from the amplifier **20** is delivered to the coil of relay **36**, thus closing its contacts **38** and causing the counter **40** to operate. If desired the relay **36** can be used to operate other devices such as a pressure indicator. It will be seen that the relay **36** will be energized only momentarily each time a puff of air occurs to cool the filamentary resistor **12** after which the contacts **38** will open.

When using the circuit of Figure 2, I have found that the filamentary resistor is relatively slow in heating up after it is cooled and as a result the counter will not operate completely satisfactorily when sheets are turned especially fast. For that reason I prefer to use the modified circuit of Figure 3. As there shown cathode **22C** is connected by means of lead **50** to a point between resistors **12** and **14** and grid **22G** is connected to bias. Since the tube **22** is conducting current will be supplied to the resistor **12**, not only through resistor **14**, but also through a parallel circuit consisting of resistor **28**, tube **22** and lead **50**. Thus the resistor **12** will be reheated much faster after each cooling than with the circuit of Figure 2. The operation is otherwise the same as in Figure 2.

While one embodiment of my invention has been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, and a counter in said circuit adapted to operate each time an air puff strikes the filamentary resistor.

2. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, and a counter connected to the output of said amplifier and adapted to be operated thereby each time an air puff strikes the filamentary resistor.

3. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, a relay coil

connected to the output of said amplifier, a counter, and a counter circuit connected to the contacts of said relay to operate said counter each time one of said articles is moved.

4. A device operable by the air puff created when an article is moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, a relay connected to the output of said amplifier and adapted to be operated thereby each time an article is moved and creates an air puff.

5. A device for counting articles which create an air puff when moved which comprises a funnel having its large end facing the articles to be counted, said funnel having an opening in its apex, a filamentary resistor mounted in said opening, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, a circuit connected across said filamentary resistor, and a counter in said circuit adapted to operate each time an air puff strikes the filamentary resistor.

6. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, said amplifier including a tube connected to said voltage source in parallel with said limiting resistor and in series with said filamentary resistor, and a counter connected to the output of said amplifier and adapted to be operated thereby each time an air puff strikes the filamentary resistor.



7. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, said amplifier including a tube connected to said voltage source in parallel with said limiting resistor and in series with said filamentary resistor, a relay coil connected to the output of said amplifier, a counter, and a counter circuit connected to the contacts of said relay to operate said counter each time one of said articles is moved.

8. A device for counting articles which create an air puff when moved which comprises a filamentary resistor, a limiting resistor of substantially greater resistance than said filamentary resistor, said resistors being connected in series across a voltage source of sufficient value to heat said filamentary resistor, means for directing each air puff against said filamentary resistor to momentarily cool the same, a circuit connected across said filamentary resistor, an amplifier in said circuit for amplifying the voltage pulse created by each puff of air, said amplifier including a tube connected to said voltage source in parallel with said limiting resistor and in series with said filamentary resistor, and a relay connected to the output of said amplifier and adapted to be operated thereby each time an article is moved and creates and air puff.

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