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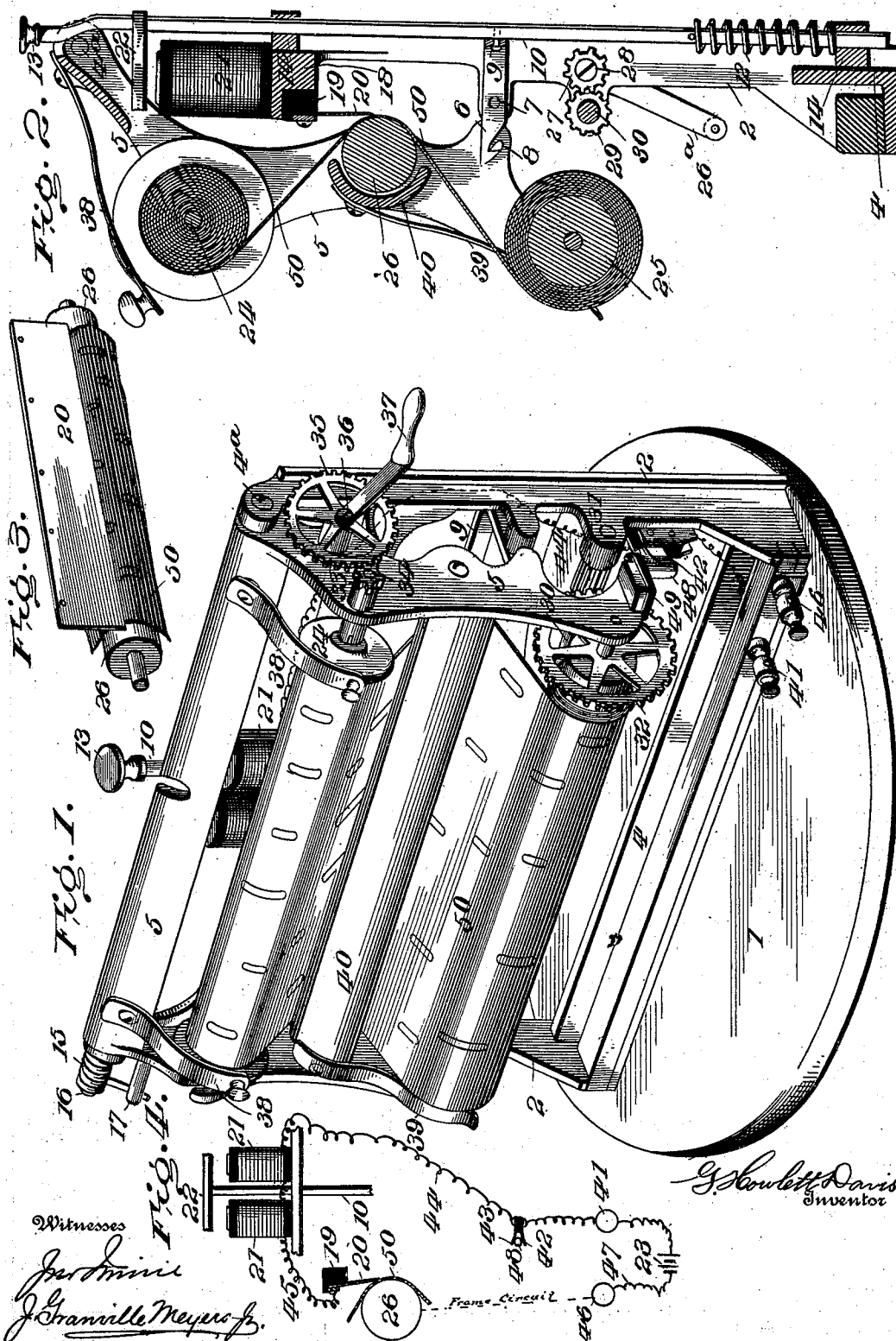
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G. H. DAVIS.

APPARATUS FOR REMOVING METALLIC PARTICLES FROM STRIPS OR WEBS.

(Application filed Apr. 17, 1901.)

(No Model.)



UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF BROOKLYN, NEW YORK.

APPARATUS FOR REMOVING METALLIC PARTICLES FROM STRIPS OR WEBS.

SPECIFICATION forming part of Letters Patent No. 692,989, dated February 11, 1902.

Application filed April 17, 1901. Serial No. 56,268. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HOWLETT DAVIS, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Apparatus for Removing Metallic Particles from Strips or Webs, of which the following is a specification.

My present invention relates to an improved machine for burning particles of iron or other magnetic metals from sheets or webs of paper.

It is a well-known fact that the thin strips of Manila paper from which perforated music-sheets are cut are impregnated throughout with small particles of magnetic iron oxid, said particles often being embedded in the paper to such an extent that when the music-sheet is employed to operate electrical self-playing musical instruments or the like the said magnetic particles complete the electric circuit, and thereby produce a false note, with a consequent discord of the musical composition. These metallic particles are very small and are hardly visible to the naked eye; but when the sheet is passed through my improved machine all such particles are quickly and effectively removed.

My improved machine comprises, broadly, a pair of electric terminals included in an electric circuit of sufficient strength to cause a sparking at such terminals when a metallic particle is caused to bridge the same and means for moving a web or sheet having such particles attached thereto or embedded therein in surface contact with the terminals, the arrangement and operation being such that as the sheet is moved forward in contact with the terminals and an iron particle in said sheet bridges the same a spark will be produced which will result in burning said particle from the sheet. As heretofore explained, these particles are, as a rule, extremely small, and the aperture left from such sparking or burning out is correspondingly small, and the sheet is not affected thereby. If, however, it should occur that a large metallic particle be encountered, I have provided means whereby the contact points or terminals will be instantly and automatically separated, thereby stopping the operation of the machine and notifying the operator of this fact.

To these and other ends the invention com-

prises the novel features of construction and combination and arrangement of parts hereinafter described in detail and then more definitely pointed out in the claims.

In order to enable others skilled in the art to make, use, and construct my said invention, I will proceed to describe the same in detail, reference being had for this purpose to the accompanying drawings, in which—

Figure 1 is a perspective view showing a complete machine constructed in accordance with my invention with a music-sheet shown in operative position therein. Fig. 2 is a transverse vertical sectional view of the same. Fig. 3 is a detail perspective view of the electric-circuit terminals between which the paper is passed, and Fig. 4 is a diagram showing the complete circuit.

Referring now to the drawings, the reference-numeral 1 designates a block or plate, from which rise a pair of side standards 2, preferably of the form and shape shown, said standards being connected at the bottom by an angle-plate 4. Hinged to the upper ends of the said side standards at 4^a is a swinging frame 5, which is normally held in the position shown in the drawings by means of catches 6, pivoted to the side standards at 7 and engaging keepers 8 on the said frame. There are two of these catches, and they are connected by a cross-bar 9, to which is secured a vertical operating-rod 10, having a spring 12 coiled about its lower end and normally acting to hold said rod elevated, so that the catches will be in locked engagement with the keepers, and the rod is provided at its upper end with a push-button 13, by which it may be operated to lift the catches. The said operating-rod is supported and guided in apertured lugs 14, projecting outward from near the side of the standards. It is desirable and important that the swinging frame 5 be arranged to automatically move outward when the catches are released from the keepers, and for this purpose I provide a coiled spring 15, having one end attached to a spindle 16, upon which the swinging frame is hung, and its opposite end acting upon a pin or projection 17 upon the swinging frame. While I have shown this manner of causing the frame to automatically swing open, I do not wish to be understood as limiting myself

to this construction specifically, for obviously any form of spring-hinge suited to the purpose may be employed.

Arranged transversely between the side standards 2 above the pivoted catches is a cross-bar 18, having an angular cut-out portion, into which is secured an insulating-strip 19, and to this strip is attached a depending metallic contact-blade 20, which forms one terminal of an electric circuit, as will presently appear. To the top face of the cross-bar 18, about midway thereof, is a pair of electromagnets 21, cooperating with an armature 22, secured to the operating-rod 10 to actuate the latter when the magnets are energized, as will hereinafter appear, said magnets being in circuit with a source of electric supply 23 and with the contact-blade 20.

Journaled in bearings in the swinging frame 5 are an upper sheet-delivery roller 24 and a lower sheet-receiving roller 25, and between these rollers is journaled a metal contact-roller 26, which when the swinging frame is in operative position bears against the metallic contact-blade 20, said roller forming the other terminal of the circuit. The receiving-roller 25 is rotated by a handle 26^a through the medium of a pinion 27, mounted upon a short shaft 28 upon the left-hand side of the machine, said pinion meshing with a second pinion 29, which is fixed to a shaft 30, the ends being journaled in the side standards. This shaft 30 is provided at its opposite ends with a gear 31, which meshes with a gear 32, secured to one end of the receiving-roller 25. The sheet to be operated upon is contained upon the delivery-roller 24, which is by preference removably attached to the swinging frame and wound upon the receiving-roller through the gearing just described. In order to rewind the sheet upon its roll 24, I have provided suitable gearing comprising a pinion 33, mounted upon the end of a shaft 34, to which the delivery-roller 24 is attached, said pinion being rotated by means of a gear-wheel 35, mounted upon a shaft 36, said gear-wheel being rotated by means of a crank-handle 37. In order to keep the sheet being operated upon taut and avoiding slack therein, I have provided friction-springs 38, which bear upon the ends of the upper or delivery roll 24, and a similar spring 39 acts upon one end of the lower or receiving roll, said spring being mounted upon a guard-plate 40, which latter extends transversely across the machine-frame and covers the front face of the contact-roller 26.

The electric circuit from the supply 23 passes to the binding-post 41, from thence to a switch comprising the insulated blades 42 43, then through wire 44 to electromagnets 21, through wire 45 to contact-blade or terminal 20, from contact-blade to contact-roller or terminal 26, and then through the metal frame of the machine to binding-post 46, and from thence through wire 47 back to battery. The swinging frame 5 is provided with a cir-

cuit making and breaking pin or projection 48, which when the frame is in operative position lies between the insulated switch-blades 42 43, thereby completing the electric circuit; but when the frame is thrown open the said pin is removed from the switch-blades, and the circuit is consequently broken. The circuit-making pin or projection 48 is insulated from the swinging frame by means of a strip of insulating material 49, as shown.

The manner of operating the machine is as follows: The sheet 50 to be treated, whether perforated or otherwise, is placed upon the delivery-roller 24, and its end passes between the electric terminals 20 and 26, and is then secured to the receiving-roller 25. This roller 25 is now revolved by the crank 26^a, and as the embedded particles in the sheet pass between the said terminals 20 and 26 during the movement of the sheet an electric circuit is completed, producing a spark which burns out the said metallic particles. The source of electric supply 23 must of course be of sufficient strength to cause a sparking at the terminals 20 and 26, and I have found that a current of twenty volts and five amperes is sufficient for the purpose in hand, although the same may be varied, and I do not limit myself to any specific strength, except that it must be sufficient to cause a sparking at the terminals. It will be understood that under ordinary circumstances the spark is so small and the current produced so short that it will not affect the electromagnets 21; but if it should happen that a large metallic particle is encountered which would produce a large spark and a correspondingly long circuit the magnet 21 would be energized sufficiently to attract the armature 22 and operate the catches 6, whereby the swinging frame would instantly and automatically fly out, thus breaking the electric circuit. This automatic action of the swinging frame is very essential, since it notifies the operator that a comparatively large hole has been burned in the paper and enables him to tell at once where such defect is, so that it may be patched up or the entire sheet removed, as deemed proper. When it is desired to release the swinging frame for any purpose, as when putting in the sheet in the first instance, it is simply necessary to depress the operating-rod 10 by a slight push with the finger upon the button 13.

Various changes and modifications in the details of my improved machine may be made without departing from the spirit of the invention, the broad principle of which comprises a pair of electric terminals in circuit with a source of electric energy of sufficient strength to cause a sparking at such terminals when a metallic particle is made to bridge the terminals, the latter being constructed and arranged to make continuous or unbroken surface contact with a sheet or web.

I do not in the present application claim the method herein described of burning me-

tallic particles from a sheet or web, as the same will form the subject-matter of a separate application.

What I claim is—

1. In a machine for burning metallic particles from a strip or web having such particles attached thereto, a pair of electric terminals constructed to make continuous or unbroken surface contact with a web or sheet, and a source of electric energy in circuit with said terminals and of sufficient strength to cause a sparking at the terminals when a metallic particle is brought therebetween whereby said particle will be burned from the sheet or web.

2. In a machine for burning metallic particles from a strip or web having such particles attached thereto, a pair of electric terminals arranged in juxtaposition, means for advancing said sheet or web in surface contact with said terminals, and a source of electric energy in circuit with said terminals, said circuit being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered whereby said particle will be burned from the strip or web.

3. In an apparatus for burning metallic particles from a web or sheet of paper, a pair of electric terminals between which the sheet is caused to pass, a source of electric supply with which said terminals are in circuit, said electric supply being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the web or sheet therebetween, and means for advancing the sheet or web.

4. In an apparatus for burning metallic particles from a web or sheet of paper, the combination with a suitable base-frame, of a pair of electric terminals between which the sheet is caused to pass, a source of electric supply with which said terminals are in circuit, said electric supply being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, a sheet-delivery roll journaled in said frame, and means for operating said roll.

5. In an apparatus for burning metallic particles from a web or sheet of paper, the combination with a suitable base-frame, of a swinging frame movably connected to said base-frame, a pair of electric terminals between which the sheet is caused to move, one of said terminals being attached to the base-frame and the other mounted upon the movable frame, a source of electric supply with which the said terminals are in circuit, said electric circuit being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, and a sheet-delivery and sheet-receiving roll journaled in the movable frame.

6. In an apparatus for burning metallic particles from a web or sheet of paper, the combination with a suitable base-frame, of a sec-

ond frame movably connected to said base-frame, a pair of electric terminals between which the sheet is caused to travel, one of said terminals being attached to the base-frame and the other mounted upon the movable frame, a source of electric supply with which the said terminals are in contact, said electric circuit being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, insulated switch-blades carried by one of the frame parts and a circuit making and breaking pin or lug carried by the opposite frame part, as and for the purpose described.

7. In an apparatus for burning metallic particles from a sheet or web of paper, the combination with a suitable base-frame, of an electric terminal blade carried by said frame, a swinging frame hinged to said base-frame and normally acting to move out of operative position, a latch for retaining the movable frame in operative position, an electric terminal surface carried by the swinging frame and arranged to make contact with the terminal blade, mechanism for advancing the sheet to be treated between the said terminals, a source of electric energy with which the terminals are in circuit, said electric circuit being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, and means for operating the latch to release the movable frame whereby it is free to automatically move out of operative position.

8. In an apparatus for burning metallic particles from a sheet or web of paper, the combination with a suitable base-frame, of an electric terminal blade carried by said frame, a swinging frame hinged to said base-frame and acting normally to move out of operative position, a latch for retaining the movable frame in operative position, an electric terminal surface carried by the swinging frame and arranged to make contact with the terminal blade, a sheet-delivery roll and a sheet-receiving roll journaled upon opposite sides of the terminal surface, an electromagnet and an armature for automatically operating the said latch, and a source of electric energy with which the terminals and magnets are in circuit, said source of electric energy being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween.

9. In an apparatus for burning metallic particles from a web or sheet of paper, the combination with a suitable base provided with a pair of upright side standards, of a swinging frame hinged to the upper portion of said standards, an electric terminal blade carried by the standards, a sheet-delivery roll and a sheet-receiving roll journaled in said swinging frame, and a metallic contact terminal roller journaled intermediate said rolls and movable

to and from the terminal blade, means for operating said rolls to advance the sheet or web between the said terminals, and a source of electric energy in circuit with the terminals, said source of electric energy being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, substantially as described.

10 10. In an apparatus for burning metallic particles from a web or sheet of paper, the combination with a suitable base-frame, of an electric terminal blade carried by said frame, a swinging frame hinged to said base-frame and normally acting to move out of operative position, a latch for retaining the movable frame in operative position, an electric terminal surface carried by the swinging frame and arranged to make contact with the terminal blades, a sheet-delivery roll and a sheet-receiving roll journaled in the swinging frame upon opposite sides of the terminal surface, means for operating said rolls, an electromag-

net an operating-rod for the said latch, an armature attached to said rod and cooperating with the said magnet, a source of electric energy in circuit with the said terminals and magnet, said source of electric energy being of sufficient strength to cause a sparking at the terminals when a metallic particle is encountered during the movement of the sheet therebetween, insulated switch-plates attached to the upright standards, and a metallic pin or projection carried by the swinging frame and arranged to enter between the said switch-plates to complete the circuit at the point when the said swinging frame is in operative position.

Signed at Brooklyn, in the county of Kings and State of New York, this 8th day of April, A. D. 1901.

GEORGE HOWLETT DAVIS.

Witnesses:

B. H. POMEROY,
THOMAS DUNN.