No. 709,966. Patented Sept. 30, 1902.

G. W. CURTISS.

CARBONIZING APPARATUS.

(Application filed Nov. 30, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

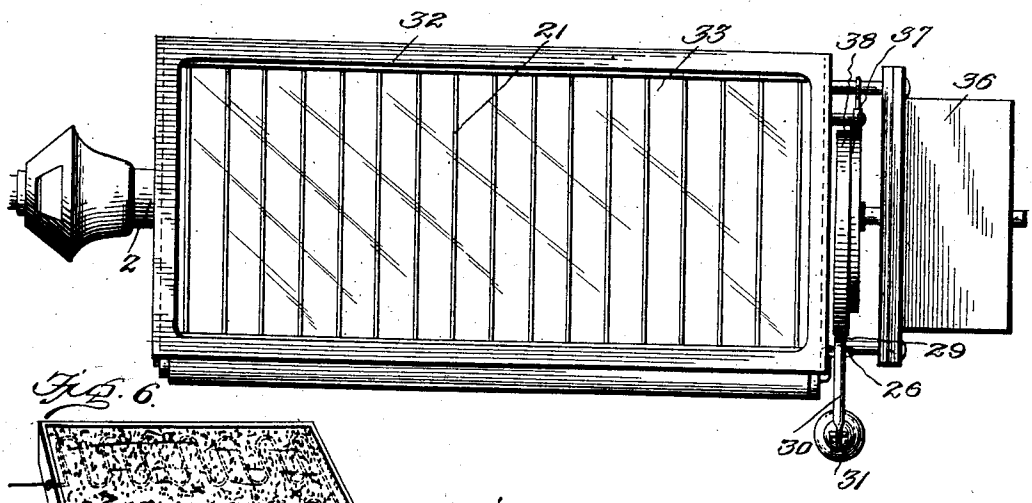



Fig. 6.

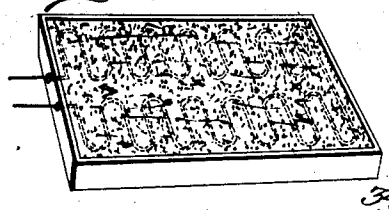
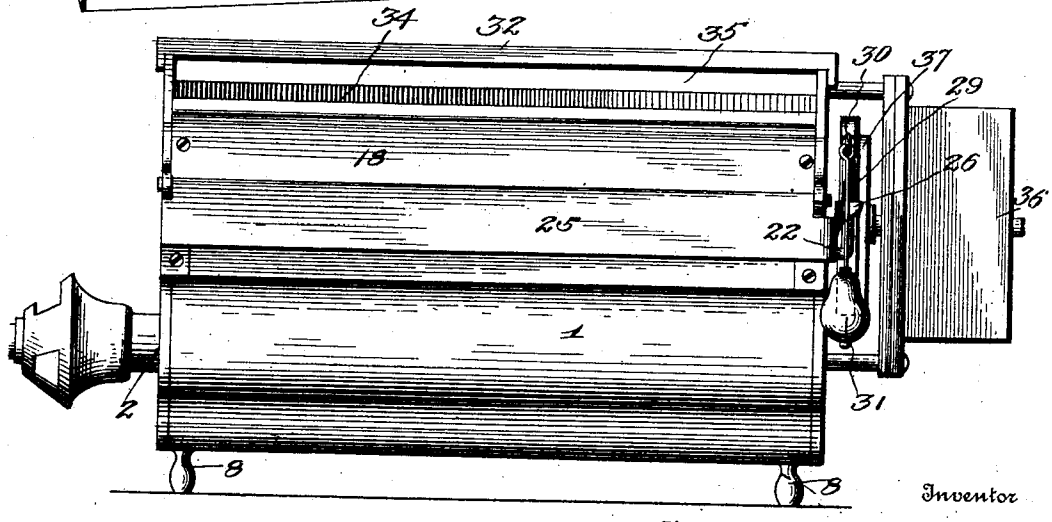


Fig. 2.




Witnesses

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## CARBONIZING APPARATUS.

(Application filed Nov. 30, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 4.

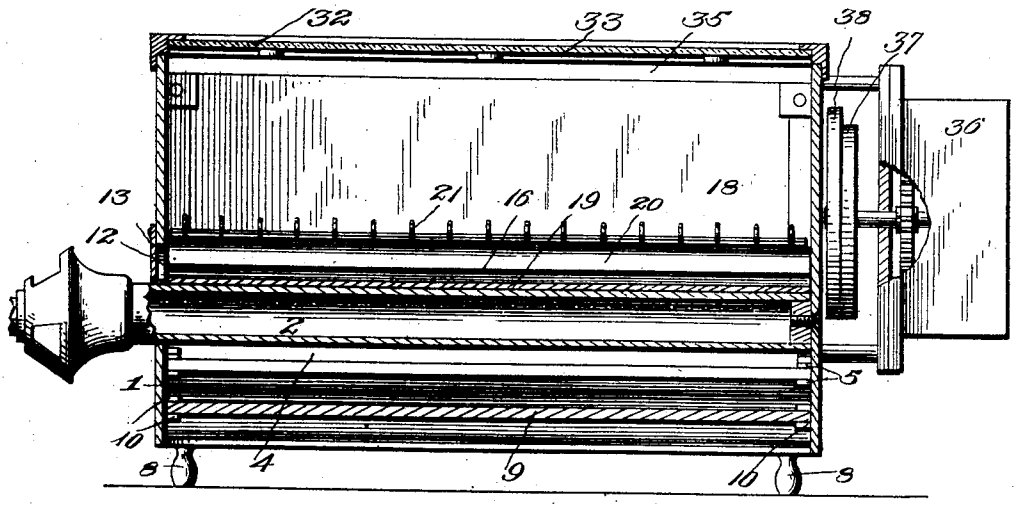



Fig. 3.

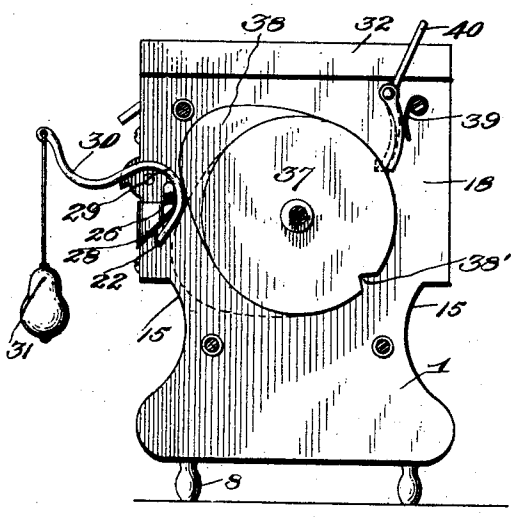
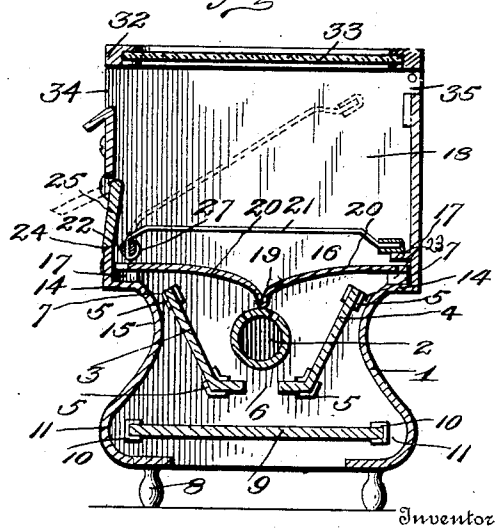



Fig. 5.




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# UNITED STATES PATENT OFFICE.

GEORGE W. CURTISS, OF PEORIA, ILLINOIS, ASSIGNOR TO MORROW PROTECTIVE PROCESS COMPANY, A CORPORATION OF ILLINOIS.

## CARBONIZING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 709,966, dated September 30, 1902.

Application filed November 30, 1901. Serial No. 84,273. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. CURTISS, a citizen of the United States, residing at Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Carbonizing Apparatus; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to carbonizing apparatus.

The apparatus is especially designed for use in a process wherein the lines to be carbonized are written or printed upon paper or some other suitable material by a colored ink, the carbonization being accomplished by subjecting the paper carrying such lines of written or printed matter to the action of artificial heat until such lines become carbonized and are rendered permanent and ineradicable.

The object of the present invention is to provide a heating apparatus by means of which the operation of carbonizing the written or printed matter may be quickly, conveniently, and efficiently carried out and in which the discharge of the heated air is so regulated and controlled as to prevent condensation of the air and sweating of the heater at the outset when the burner or heating medium is set in action, thereby enabling the apparatus to be used as soon as the heat reaches the proper point without liability of the papers becoming saturated with moisture or otherwise injured.

A further object of the invention is to provide a heating apparatus of this character in which the process of carbonization may be readily viewed from the exterior and in which provision is made for the convenient entry before and the discharge of the checks or papers after carbonization of the written matter has been effected.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, which will be hereinafter more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a top plan view of the carbonizing apparatus. Fig. 2 is a front elevation thereof. Fig. 3 is an end elevation. Fig. 4 is a longitudinal section, and Fig. 5 is a cross-section showing in broken lines the rack tilted and the gate opened to discharge the check or paper resting on the rack. Fig. 6 is a detail view showing a construction of electric heater which may be used.

Referring now more particularly to the drawings, the numeral 1 represents the casing of the heater, which, as shown, is of rectangular form, but may be of any preferred shape and size to suit the purpose and the taste or fancy of the manufacturer or user. Extending longitudinally within the base portion of the casing is a gas-burner 2, to which air and gas in proper proportions are supplied through suitable connections, not necessary to be herein described. On opposite sides of this burner are sheets 3 and 4, of asbestos paper, which extend below the burner and flare or incline outwardly and serve as shields to prevent the sides of the casing from being unduly heated by the direct heat from the flames. These sheets are retained in position by lugs 5, which permit of their ready application and removal and are separated at their lower edges to form an inlet 6 for the entrance of air and are also spaced from the sides of the casing to form air-passages 7, through which air is supplied to the base of the casing which forms the burner-chamber to support combustion. The casing is supported at a suitable elevation by feet 8 and is preferably left open at the bottom and provided below the burner and shields 3 and 4 with a horizontal shield 9, also formed of asbestos, which is detachably held in place by lugs 10, said shield having its longitudinal side edges spaced from the sides of the casing to form air-inlets 11, through which the air enters the casing and flows upwardly through the inlet 6 and passages 7 to the burner-chamber. A peephole 12, closed by a pivoted cover 13, is provided in one end of the casing to enable the burner to be observed from without to determine whether or not the gas is ignited and the burner is properly working.

At the top of the burner-chamber the cas-

ing is provided with longitudinal flanges or ledges 14, which are preferably formed by concaving the sides of the chamber below, as shown at 15, and these flanges or ledges serve as supports for a removable spreader-plate 16, having feet or lugs 17 to rest upon said flanges and to hold the plate elevated to form spaces for the passage of the hot air from the burner-chamber to the heating-chamber 18 thereabove. The spreader-plate is provided at the center with a ridge or divider 19 to spread the flames and heated air laterally, and its sides or wings 20 curve outwardly and upwardly, forming deflectors to throw the heat away from the hottest point—*i. e.*, the center—and to guide the hot air to the said spaces for passage into the heating-chamber and itself radiate and diffuse the heat (instead of confining the same at one point) and to distribute the same as far as possible, so as to uniformly heat said heating-chamber and evenly carbonize such written or printed matter.

Arranged within the heating-chamber is a perforate, foraminous, or open-work tray or rack 21, which may be constructed in various ways and is mounted at its front or outer side edge upon a rock-shaft or trunnion-shaft 22 and is adapted to rest at its rear or inner side edge upon a flange or ledge 23, formed upon the rear side of the casing above the adjacent ledge 14. The rock-shaft 22 is located in line with the lower edge of a discharge-opening 24, formed in the front of the casing, which discharge-opening is closed by a pivoted gravity closing gate or door 25, having at one end a right-angularly-projecting contact-piece 26. This gate is provided with trunnions $25^a$, journaled in bearings $25^b$ on the casing. The rock-shaft obtains bearing at one end through an opening 27, formed in one end of the casing, and at its opposite end in a slot or open bearing 28, formed in the opposite end of the casing and communicating with said discharge-opening. By this construction the tray or rack is mounted so as to be readily insertible and removable through the said discharge-opening 24. The rack or tray is adapted to tilt with the rock-shaft to discharge the carbonized check or paper through the opening 24, and it is desirable to this end to have the gate or door 25 open automatically when the tray is tilted. To effect this, the shaft is extended and bent at one end to form a curved portion 29, which acts in the nature of a cam upon the contact-piece 26 to swing the said gate or door open when the shaft is rocked to tilt the inner edge of the tray upwardly to form, as shown in Fig. 5, an inclined plane, down which the check or paper slides and discharges through the opening 24 to the exterior. The cam portion 29 terminates in an arm 30, to which is attached a handle 31, by which the shaft is rocked. When this handle is released after having been pulled down to tilt the tray, swing open the gate, and discharge the paper, the said tray and gate automatically return to their normal positions by gravity.

The body portion of the tray is composed of spaced strands of wire or strips of metal of such size as to form thin metallic rests or supports for the paper placed thereon, relatively thin material being used in order to secure the quick and even heating of said supports and even carbonization of the material. As shown, the supports are preferably slightly elevated between their ends and the latter bent downward at an inclination in order to prevent the paper which is being placed on the tray or discharged therefrom from being caught or hung against the rock-shaft or rear edge of the tray. The purpose of the gate or door 25 is to normally close the opening 24 to prevent loss of heat in the lower portion of the heating-chamber and cause the hot air to rise above the tray to the upper portion of said chamber.

The top of the heating-chamber is closed by a cover 32, which is either hinged, as shown, or made detachable, so as to afford access to the interior of the casing to admit of the insertion and removal of the spreader and other parts and the cleaning of the burner or heating device when needed. This cover may be provided with a transparent panel 33, through which the process of carbonization may be viewed.

The papers or materials which are to be deposited upon the tray or rack to carbonize the writing thereon are inserted through an inlet slot or opening 34, formed in the front wall of the casing immediately below the cover, and in the rear wall of the casing is formed a slot or opening 35, which is located diametrically opposite said slot or opening 34. These openings allow the surplus heat to discharge to the atmosphere, also create the necessary draft, and cause the discharge of the heated currents of air at the proper point to carry off what slight particles of moisture or water of condensation from the atmosphere which are deposited upon the sides of the casing after the burner has been started, thereby preventing the access of moisture to the interior of the casing. The slight amount of moisture resulting at the outset is deposited in the main on the panel 33, from which it is quickly carried off or evaporated, and as this panel prevents such moisture or water of condensation from passing into the casing while the heated currents of air prevent access of moisture through the openings 34 35 the interior of the heating-chamber always remains dry and injury to the checks or papers deposited on the tray or running or blurring of the matter written thereon is effectually prevented.

It will of course be understood that instead of the gas-burner any desired type of heating means may be employed. Where electricity is used, the electric heater, in the form of a plate A, carrying the resistance, will be seated on the flanges or ledges 14, and the flange

23 will be dispensed with to enable said plate to be conveniently inserted and removed through the top of the casing.

In some cases it may be found desirable to provide means for automatically tilting the tray and opening the discharge-gate at a predetermined period after the check or paper to be carbonized has been placed on said tray. To this end I may provide upon one end of the casing a spring-motor 36, to the shaft or main arbor of which is fixed a cam 37, having an acting surface 38 to engage the cam-surface 29 of the rock-shaft and actuate said shaft and gate. The action of this cam will of course be so timed that it will tilt the rock-shaft a sufficient time after it has been set in action to insure the perfect carbonization of the writing before discharging the same. The motor is stopped and started by the movement of a pivoted spring-pressed stop or pawl 39 into and out of the path of the surface 38 of the cam. The stop has a finger-piece 40, by which it may be moved out of engagement with the said surface 38 at the time the paper is deposited on the tray, thus leaving said cam free to be rotated by the motor, and after the tray has been tilted in the manner described the stop will drop by gravity into a notch 38', formed in the cam, to arrest the action of the cam and motor.

The writing on the papers or materials to be treated is done by a suitable chemical writing fluid which is adapted to sink into the fiber of the paper and when subjected to artificial heat to become carbonized, thus rendering the writing permanent and ineradicable.

From the foregoing description, taken in connection with the accompanying drawings, the construction, mode of operation, and advantages of my invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and details of construction may be made within the scope of the invention without departing from the spirit or sacrificing any of the advantages thereof.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an apparatus for carbonizing ink on paper, the combination with a casing having a heating-chamber and insertion and discharge apertures, of means for heating said chamber, a support within the heating-chamber for the paper carrying the lines of writing to be carbonized, a gate or door closing the discharge-aperture, and an operating device having a predetermined time movement to automatically tilt the support and open the door at a definite interval after starting, whereby the carbonization of the lines of writing is timed, by inserting the paper into the heating-chamber before or after the starting of the operating device, substantially as set forth.

2. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and insertion and discharge apertures, means for heating said chamber, a tilting tray or rack arranged within said chamber for supporting the paper carrying the lines of writing to be carbonized, a door closing the discharge-aperture and carrying a contact-piece, a rock-shaft for tilting the tray, and means for simultaneously operating the rock-shaft to tilt the tray and engaging said contact-piece to open the door to allow the paper to discharge, substantially as set forth.

3. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and insertion and discharge apertures, means for heating said chamber, a tilting tray or rack arranged within said chamber for supporting the paper carrying the lines of writing to be carbonized, a door closing the discharge-aperture and carrying a contact-piece, a rock-shaft for tilting the tray, a cam carried by the rock-shaft for engaging said contact-piece to open the door, and means for operating the rock-shaft, substantially as set forth.

4. In an apparatus for carbonizing ink on paper, the combination with a casing having a heating-chamber and insertion and discharge apertures, of means for heating said chamber, a tilting tray or rack arranged within said chamber for supporting the paper carrying the lines of writing to be carbonized, a door closing the discharge-aperture and carrying a contact-piece, a rock-shaft for tilting the tray, means for simultaneously operating the rock-shaft to tilt the tray and engaging said contact-piece to open the door, and further means having a predetermined time movement to actuate the means first named to tilt the rack or tray and open the door at a definite interval after starting, whereby the carbonization of the lines of writing is timed, by inserting the paper into the heating-chamber before or after the starting of the operating means, substantially as set forth.

5. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and insertion and discharge apertures, means for heating said chamber, a tilting tray or rack arranged within said chamber for supporting the paper carrying the lines of writing to be carbonized, a door closing the discharge-aperture and carrying a contact-piece, a rock-shaft for tilting the tray, means for simultaneously operating the rock-shaft to tilt the tray and engaging said contact-piece to open the door, a cam for operating the means first named, and a spring-motor for automatically operating the cam, and a stop device for starting and stopping said spring-motor, substantially as set forth.

6. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, a device within the chamber for supporting the paper carrying the lines of writing to be

carbonized, said device having comparatively thin-spaced linear strands forming an open-work surface for the paper to rest upon, and means for actuating said device for discharging the paper through said aperture, substantially as described.

7. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, a support within the chamber for the paper carrying the lines of writing to be carbonized, and a rock-shaft connected to the support at one of its edges and adapted to be positively turned to tilt the support to discharge the paper through said aperture, the portion of the support contiguous to the shaft being shaped to form a surface devoid of crevices or projections in which the paper may hang or lodge as it slides off the support, substantially as set forth.

8. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber provided at its top with a transparent panel and discharge-apertures for the heated air, one of which apertures serves as an inlet for the insertion of the paper carrying the lines of writing to be carbonized, said casing also having a discharge-aperture at the base of the heating-chamber, a gate or door closing said aperture, a tilting tray or rack to support the paper, a heating device located in the base of the casing for heating said chamber, a spreader or deflector located between the heater and tray for equably distributing the heat and conducting the heated air to opposite sides of the chamber, and means for simultaneously tilting the tray and opening the door to discharge the paper through said discharge-aperture, substantially as set forth.

9. In an apparatus for carbonizing ink on paper, a casing having a heating-chamber, a heating device below said chamber, a spreader above the heater for equalizing the distribution of heat to the chamber, and a tilting tray above the deflector for supporting the paper carrying the lines of writing to be carbonized, substantially as set forth.

10. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, means for heating said chamber, a foraminous or open-work support within the heating-chamber for the paper carrying the lines of writing to be carbonized, and means for actuating said support to discharge the paper through said aperture, substantially as set forth.

11. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber, and a discharge-aperture, means for heating said chamber, a support within the heating-chamber for the paper carrying the lines of writing to be carbonized, a gate or door closing the discharge-aperture, and means coacting between the support and gate whereby said support and gate may be simultaneously and positively tilted and opened to discharge the paper, substantially as specified.

12. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, means for heating said chamber, a support within the heating-chamber for the paper carrying the lines of writing to be carbonized, a gate or door closing the discharge-aperture, and an operating device engaging the support and gate for simultaneously tilting the support and opening the gate to discharge the paper, substantially as set forth.

13. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, means for heating said chamber, a support within the casing for the paper carrying the lines of writing to be carbonized, means for normally sustaining the support in a fixed position relative to the casing and contiguous to the aperture, and an exterior operating device for temporarily inclining the support to discharge the paper after the lines thereon have been carbonized, substantially as described.

14. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, means for heating said chamber, a support within the chamber for the paper carrying the lines of writing to be carbonized, said support being in a position contiguous to the aperture, and means projecting to and operable from the exterior of the chamber for actuating the support to discharge the paper through said aperture, substantially as specified.

15. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber and a discharge-aperture, means for heating said chamber, a tilting support within the chamber for the lines of writing to be carbonized, said support having a fixed axis, means for tilting said support, said means being connected to said support and insertible and removable therewith through the discharge-aperture, substantially as set forth.

16. An apparatus for carbonizing written or printed matter upon paper embodying a heating-chamber and means for heating the same, in combination with a support for the paper, and means adapted to be operated from the exterior of the casing for actuating said support to discharge the paper, substantially as described.

17. In an apparatus for carbonizing ink on paper, the combination of a casing having a heating-chamber provided at its top with a transparent panel and discharge-apertures for the heated air, one of which apertures serves as an inlet for the insertion of the paper carying the lines of writing to be carbonized, said casing also having a discharge-aperture at the base of the heating-chamber, a gate or door closing said aperture, a tilting tray or rack to support the paper, means for

heating the chamber, and means for simultaneously tilting the tray and opening the door to discharge the paper through said discharge-aperture, substantially as set forth.

18. In an apparatus for carbonizing ink on paper, the combination of a heating-chamber provided at its top with a transparent panel and vent-apertures for the heated air, one of which apertures serves as an inlet for the insertion of the paper carrying the lines of writing to be carbonized, said casing also having a discharge-aperture for the paper at or near the base thereof, a support within the casing for the paper carrying the lines of writing to be carbonized, and means for actuating said support for discharging the paper through said discharge-aperture, substantially as specified.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

GEORGE W. CURTISS.

Witnesses:
E. F. CAVERLY,
BENJ. G. COWL.