

(No Model.)

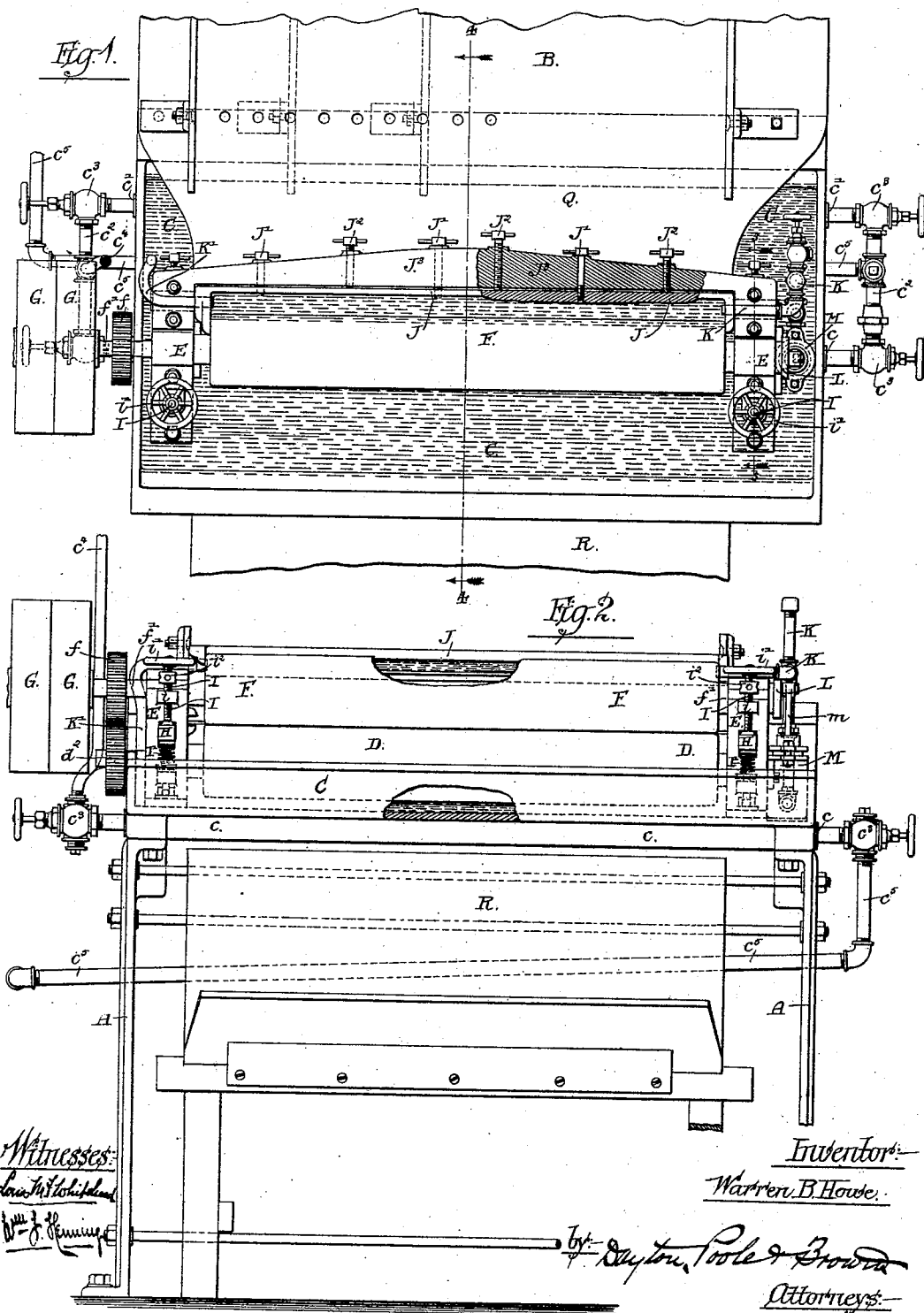
3 Sheets—Sheet 1.

W. B. HOWE.

PROCESS OF AND APPARATUS FOR APPLYING PARAFFINE TO PAPER.

No. 437,435.

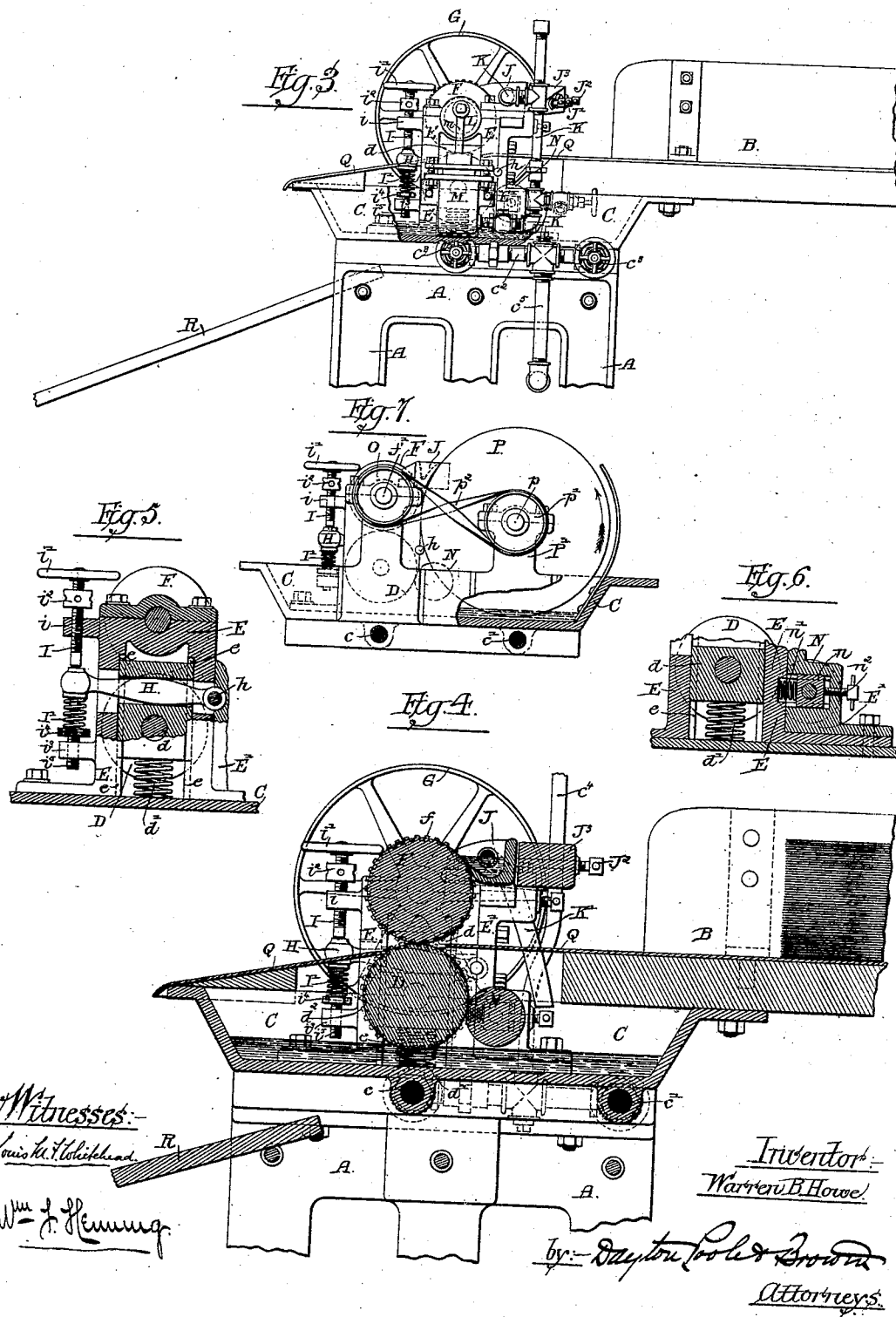
Patented Sept. 30, 1890.



(No Model.)

3 Sheets—Sheet 2.

W. B. HOWE.
PROCESS OF AND APPARATUS FOR APPLYING PARAFFINE TO PAPER.
No. 437,435.
Patented Sept. 30, 1890.



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(No Model.)

3 Sheets—Sheet 3.

W. B. HOWE.

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Fig. 8.

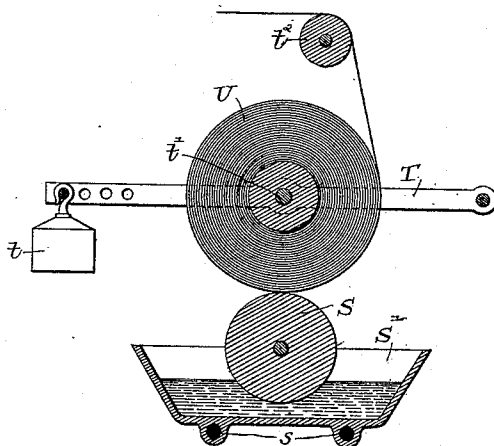


Fig. 9.



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UNITED STATES PATENT OFFICE.

WARREN B. HOWE, OF CHICAGO, ILLINOIS.

PROCESS OF AND APPARATUS FOR APPLYING PARAFFINE TO PAPER.

SPECIFICATION forming part of Letters Patent No. 437,435, dated September 30, 1890.

Application filed April 28, 1890. Serial No. 349,754. (No model.)

To all whom it may concern:

Be it known that I, WARREN B. HOWE, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful
5 Improvements in the Process of and Apparatus for Applying Paraffine to Paper and other Absorbent Materials; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the
10 accompanying drawings, and to the letters and numerals of reference marked thereon, which form a part of this specification.

My invention relates to coating with paraffine porous or absorbent materials—such as
15 paper, cloth, or wood—so as to render the same water-proof and thus adapt them for use as a moisture excluding or retaining covering when applied as a wrapping, or for making boxes for articles of commerce, or to render
20 them capable of excluding or retaining grease or other liquid or semi-liquid substances; and the object of my invention is to produce webs or sheets of such material upon which the paraffine is applied as an external adherent
25 coating or layer, thereby affording an article of superior neatness of appearance and finish as compared with similar paraffined material heretofore produced, while at the same time affording greater economy in the quantity
30 of paraffine used.

My invention embraces both a novel method or process of applying a coating of paraffine of the character above set forth and a machine for carrying out such process.

35 As it relates to the process or method, my invention consists in transferring to the web or sheet of paper or other substance liquid paraffine from a surface or roller coated therewith, when the said surface or roller and the
40 paraffine thereon are at a temperature near the melting-point of the paraffine, by passing the sheet or web under pressure over the surface or roller, the sheet or web being at such temperature that it will chill the paraffine
45 and thus prevent the latter from being absorbed.

In carrying out this process it is necessary to employ a sheet or web having sufficient thickness or body to chill the paraffine before the latter can penetrate the same to any considerable extent, thereby leaving the bulk of the paraffine in the form of a thin film on the

surface of the sheet or web, and that the roller or surface employed to transfer the paraffine to the sheet or web should be of the
55 same temperature as the paraffine and should be pressed against the sheet or web as the latter passes over the same. I have found that the best results are obtained when the sheet or web is passed rapidly over the surface or
60 roller, the thickness of the coating depending upon the speed at which the sheet or web is carried over or against such surface or roller. Good results are obtained in practice when the sheets or web pass over the surface or
65 roller at a speed of from one hundred and fifty to two hundred and fifty feet per minute. It is of course obvious that the more rapid the speed at which the sheet or web passes over the surface or roller the thinner
70 will be the coating applied.

I have herein shown a machine of a form which I have found best adapted for carrying out my process, the same embracing revolving paraffine-applying rollers and suitable
75 paraffine heating and feeding devices. As far as my novel process is concerned, the same general result may, however, be obtained by the use of hand-tools; but the invention can best be carried out by the use of a machine,
80 because with such tools it is difficult to evenly or uniformly apply the paraffine to sheets or webs of large size. Paraffine sheets or webs of paper, pulp-board, or other porous or absorbent material, as heretofore constructed,
85 is either saturated with the paraffine or both coated and saturated with the same, the paraffine being applied when so hot as to penetrate the sheets or webs or when the latter is heated sufficiently to permit such penetra-
90 tion.

The novel product herein claimed differs from similar products heretofore made mainly in the less quantity of paraffine used and in the improved finish or appearance given to
95 the product. This will be better understood by consideration of the fact that whenever paper of any kind or other porous material is soaked with paraffine its color is changed and it becomes darker in the same manner as
100 when wet with water. When paraffine is applied in the ordinary manner to lined straw-board, for instance, the saturation of the white paper lining of the straw-board renders

the latter less opaque, so that the dark color of the straw-board shows through the lining and the white color of the board is thereby destroyed, giving it a dark coarse appearance and making it unsuitable for use where a clean and white surface is desired. The paper or lined straw-board made as proposed by me, however, has an external adherent coating which does not penetrate at the time of its application or thereafter sufficiently to change the color of the paper to any appreciable degree. Paper, straw-board, or other substances thus coated therefore retain their original color and appearance, except that in case of colored or tinted papers it brightens the color and in all cases gives a smooth and pleasing surface to the paraffined product, rendering it capable of use in many places where as heretofore made it could not be well applied.

In order that the process constituting my invention may be more fully understood, I will describe the same, having reference to the accompanying drawings, in which—

Figure 1 is a plan view of an apparatus adapted for carrying out my improved method. Fig. 2 is a front elevation of the same. Fig. 3 is an end elevation of the same. Fig. 4 is a vertical longitudinal section of the same on the line 4 4 of Fig. 1. Fig. 5 is a detached view, in vertical cross-section, of the bearings of the lower feed-roll and its adjusting devices on line 5 5 of Fig. 1. Fig. 6 is a similar view of one of the adjustable bearings of the scraper-roll. Fig. 7 is a side elevation of a modified arrangement for transferring the liquid paraffine from the lower to the upper reservoir. Fig. 8 is a detached view, in vertical longitudinal section, of a modified arrangement for carrying out my invention. Fig. 9 is a sectional view, greatly enlarged, of a sheet of lined straw-board coated with paraffine in accordance with my improved method.

Referring now to the accompanying drawings, A designates the frame-work of a machine adapted to carry out my improved method or process, said frame being of oblong rectangular form and having connected with it at one end a table B to sustain the sheets which are to be coated with the paraffine. The front end of this table rests upon or is adjacent to the rear side of a tank or receptacle C, which occupies the entire area of the top of the frame A. Beneath this tank C extend steam pipes or passages $c\ c'$, which are preferably cast integral with the tank, so as to communicate heat to the contents thereof. These pipes $c\ c'$ are connected at their ends by cross-pipes c^2 , thus forming a continuous passage or circuit for the steam, valves $c^3\ c^3$ being provided for regulating the quantity of steam passing through said pipes, as desired. Steam is supplied to the pipes $c\ c'$ by a pipe c^4 , which leads from a suitable generator, and is carried off by an exhaust-pipe c^5 , as shown.

D designates a roll which extends horizontally within and across the reservoir C and

the ends of which are journaled in vertically-movable blocks or bearings d , confined in guides e , which are formed in upright frame-pieces E, as shown. Between the under sides of the bearings d and the lower ends of the guides e are placed spiral springs d' , which exert upward pressure upon the bearings and thus tend to sustain the roll D at the uppermost limit of its movement. At one end the shaft of the roll D carries a gear-pinion d^2 , which intermeshes with a similar gear-pinion f upon the shaft f' of an upper horizontal roll F. This upper roll F is journaled immovably in the upper part of the frame E, and its shaft, at the end upon which the gear-pinion f is mounted, carries the fast and loose belt-pulleys G, by the former of which power is applied to the entire machine. It will thus be seen that normally the rolls D and F work in contact with each other, and that the pressure of the lower roll D against the upper roll F is due to the action of the sustaining-springs d' of the lower roll. In order to regulate this pressure of the lower roll and to vary it to meet the requirements of different kinds or thicknesses of paper, a lever H is pivoted at one end upon the bearing-frame E, as shown at h , and extends at its opposite end outwardly beyond the front of said frame. There are of course two of these levers H—one for each end of the roll—and each lever bears upon the upper side of the adjacent bearing-block d . At its free end each lever H is engaged by the lower end of a bearing-screw I, which works vertically through a lug i on the front of the corresponding frame E. A hand-wheel i' is attached to the upper end of the screw I to facilitate its manipulation, and a jam-nut i^2 is provided for retaining the screw in any desired position of adjustment. Thus it will be seen that by depressing the levers H by means of the screws I the pressure of the lower roll D against the upper roll F may be varied as desired.

As a separate improvement I provide springs $I' I'$, arranged to act upon the levers H in opposition to the adjusting-screws II. Said springs I' , as herein shown, are sustained at their lower ends by lugs $i^3\ i^3$, extending horizontally outward from the bearing-frames E, and are arranged to bear upwardly at their upper ends against the end portions of the said levers H H. To enable the tension of the said springs $I' I'$ to be adjusted, the springs are desirably arranged to rest at their lower ends on plates or disks $i^4\ i^4$, located over the lugs $i^3\ i^3$, and set-screws $i^5\ i^5$ are inserted through said lugs and act upwardly against the said plates or disks $i^4\ i^4$. The said plates or disks $i^4\ i^4$ are shown as attached rigidly to the upper ends of the set-screws; but they may be otherwise connected therewith, as may be desired or preferred in practice. One important advantage gained by the employment of the springs $I' I'$ is that said springs, by their upward pressure against the levers H H, act to retain said levers constantly in bearing

against the bearing-blocks $d\ d$, thereby preventing relative movement or lost motion in the parts when the same are moved, or any shifting or jarring of the parts during the operation of the machine. Said springs $I' I'$, furthermore, being located in a position where they are accessible, and being provided with adjusting devices, as described, may be adjusted in their tension to give greater or less pressure at the opposite ends of the rolls, as desired or found necessary for the perfect working of the machine. The lifting-springs $d' d'$, hereinbefore referred to, by reason of their location, cannot be conveniently adjusted, and said springs will therefore be made sufficiently strong to give only the lightest pressure required in the working of the machine; but by using the adjustable springs $I' I'$ any additional pressure needed at one or both ends of the rolls may be obtained, as found desirable or necessary.

The receptacle C is designed to receive the paraffine and to retain it in melted or fluid condition, so as to be readily taken up by the lower roller D , by which it is transferred to the under side of the sheet, as hereinafter more fully described. The upper roll F applies the paraffine to the upper side of the sheet, and it receives its supply of paraffine from an auxiliary trough or reservoir J , which extends horizontally above the main receptacle or reservoir C . This reservoir is shown as of approximately U shape in cross-section with its front edge in contact with the rear of the roll F . At its ends the trough or receptacle J is supported upon the frames E , and it receives its supply of paraffine from the lower receptacle C through the medium of a pipe K , which leads from the lower reservoir C .

In order to feed the paraffine from the lower reservoir to the upper or auxiliary one, I connect the pipe K with a suitable pump, preferably operated directly from one of the rolls which apply the paraffine to the paper. For this purpose I have shown a crank-disk L mounted upon the opposite end of the shaft f' of the upper roll F from that which carries the gear f . This disk L is connected to the upper end of the connecting-rod m of the plunger or piston of a pump M of any suitable type. Thus it will be seen that as the upper roll revolves the pump M will constantly feed the paraffine through the pipe K to the upper reservoir or trough J , the capacity of such pump being obviously so gaged as to supply approximately only the required amount of paraffine necessary to replace that which is fed to the roll F . The overflow from the upper reservoir or trough J , however, is returned back to the lower reservoir C by a pipe K' , which opens out of the opposite end of the trough from the inlet-pipe K , before described. It is desirable that the roll F should receive from the reservoir J only so much paraffine as affords a coating of desired thickness upon the paper, and to this end the trough J is

rendered horizontally adjustable toward and away from the roll F by means of adjusting-screws $J' J^2$, which are threaded horizontally through a stationary bar J^3 , which extends horizontally across the machine back of the trough J , and the ends of which rest upon the frame-pieces E , before mentioned. The said screws $J' J^2$ are arranged in alternation along the bar J^3 , the screws J' entering the back of the trough, while the screws J^2 abut at their inner ends against said trough. By this arrangement of the screws the trough may be readily and exactly adjusted toward or away from the roll F in an obvious manner.

In order to regulate the quantity of paraffine taken up by the lower roll D , a scraping-roll N is mounted horizontally behind the lower roll in horizontally-movable bearing-blocks n , which rest in guides in rearward extensions E' at the ends of frames E . Spiral springs n' are interposed between the blocks n and the adjacent vertical parts of the corresponding frame-pieces E and tend to force the bearing-blocks away from the frame-pieces E , and thus carry the roller N away from the lower roll D .

For the purpose of keeping the clearing-roller in proper position relatively to the lower roll F , adjusting-screws n^2 are inserted horizontally through the extensions E' and act against the blocks n . By turning the screws n^2 in one or the other direction the scraping-roll N will be moved toward or away from the lower roll, so as to limit the quantity of paraffine taken up by the same, as desired.

In Fig. 7 I have shown a modified arrangement, which may be used in lieu of the pump M for feeding the paraffine from the lower to the upper reservoir. In this arrangement the pipe K is dispensed with and a pulley O is mounted upon one end of the shaft f' of the upper roll F .

A disk P is mounted upon a shaft p , having bearings in standards P' , which rest on the bottom of reservoir C . At one end the shaft p carries a pulley p' , over which runs a crossed belt p^2 , leading over the pulley O on the shaft of roller F , so that the disk is rotated in the direction indicated by the arrow. The lower part of disk P dips into the paraffine in reservoir C , and the upper part of said disk scrapes at its side against one end of the trough J , so that the paraffine carried up by the disk is scraped off into the trough and thence fed to the upper roll F .

Metal plates $Q\ Q$ rest over the top of reservoir C at opposite sides of the rolls, forming a slot or opening for the lower roller D to work through. A support R is provided at the front of the machine for the coated sheets to fall upon.

The operation of the machine is as follows: The paraffine is placed in the lower reservoir C and melted therein by the heat from the pipes $c\ c'$, and power is applied to the machine by which the rolls are turned, and paraffine is pumped or otherwise carried to the

upper reservoir or trough J. The sheets of paper or board are piled upon the table A and fed successively to the rolls D F, between which the sheets are rapidly carried, imposing a thin layer of paraffine upon the sheets. In paraffining one side only two sheets are preferably fed into the machine together or when in contact with each other, so that one side only of each sheet receives the paraffine coating. The paraffine becomes chilled or set immediately as the sheets pass from between the rolls D F, and said sheets fall upon the support R as they leave said rolls, the paraffine coating being set when the sheets reach the support, so that the sheets may be piled on the support without injury. Owing to the rapidity with which the sheets pass between said rollers and the quickness with which the paraffine coating is cooled or becomes set, there is no opportunity for the paraffine to enter the pores of the paper, and it remains in the form of a thin adherent film on the surface thereof. The sudden or rapid cooling of the paraffine is facilitated, as hereinbefore described, by keeping the paraffine and also the rolls D and F at a temperature only slightly above the melting-point thereof. The paper is not allowed to become heated, but is fed to the machine when at the normal temperature of the atmosphere or other temperature lower than the melting-point of the paraffine, thus insuring the chilling or hardening of the paraffine as the paper leaves the rolls and before the paraffine has time to soak into or penetrate the paper. The distance apart to which the rolls F and D are adjusted has an important bearing on the operation of the machine described, both of the rolls being covered by a thin coating or film of liquid paraffine during the operation of the machine. If said rolls are brought so close together that the paraffine coatings or films on the rolls come into contact with each other, the result will be that the liquid paraffine will accumulate or become dammed up in the angle at the entering side of the rolls, thereby forming a body or flood of liquid paraffine at this point. If the machine is operated when the rolls are running in this manner, the forward edge of the sheet of paper as it approaches the rolls will enter this body or flood of liquid paraffine and must pass through the same before coming into contact with the rolls themselves. In so passing through such mass or body of paraffine a large quantity of paraffine will congeal upon the edge of the sheet before it reaches the rolls, thus making a thick and unsightly ridge of paraffine along the front margin of the sheet and giving the sheet an uneven appearance. I avoid the undesirable result above described by so adjusting the rolls and controlling the quantity of paraffine fed to both of the rolls that the films or coatings of paraffine on the two rolls will not touch each other when there is no material passing between the rolls. This position of the rolls may be ascertained by observing

that a clear space exists between the rolls when they are revolving. The rolls are of course adjusted at such distance apart as to bear forcibly upon the sheet passing between them, whatever may be the thickness of the sheet. Thin paper, straw-board, or other material may be more conveniently operated upon by running two or more sheets through the machine at once, it being of course understood that in such case if it is required to apply paraffine to both sides of the sheets each sheet may be put through a second time. This may be done by running through two sheets together and then reversing both sheets and running them through again, or by running through a pile of sheets, two at a time, and after all of the sheets have been paraffined on one side running the pile through again, two by two, the outer sheet being removed from one side of the pile and placed at the other side of the pile, so as to bring together the coated sides of the two sheets which are taken from the pile to be fed to the machine. It is possible, however, to operate upon one sheet at a time even when the material is relatively thin, inasmuch as the quantity of paraffine fed to the rolls D and F may be adjusted to give a very thin film or layer on the rolls, in which case they may be brought very close together.

It is of course to be understood that the operation of the machine in applying a coating of paraffine to fabric, wood, or other porous material is the same as in operating upon paper or pulp-board.

In Fig. 8 I have shown an arrangement for coating material in the form of a continuous web or roll. In this instance the distributing-roll S is mounted horizontally in the reservoir S', in which the paraffine is placed and heated by the steam-pipes s, as before. T is a lever pivoted at one end above the reservoir and extending horizontally over the same. The lever T carries at its free end a weight t, which serves to depress the lever. Two of these weighted and pivoted levers are provided, and upon these levers is journaled a shaft t', on which the web or roll U is wound. A roller B is mounted horizontally above and to one side of the roll-shaft t', and over this passes the material from the roll. It will thus be seen that as the web is unwound from the roll it will pass rapidly over the distributing-roll S, by which a thin non-penetrating film or coating will be applied to the web in the same manner as hereinbefore set forth.

In Fig. 9 I have illustrated the appearance of lined pulp-board after treatment by my improved method. 1 designates the body of the board, which is of straw or other common stock. 2 is the paper facing or lining, which is of a better quality of paper than the body 1. 3 designates the paraffine in the form of a thin adherent film or coating, which adheres to the paper without penetrating the interstices of the same to any appreciable extent.

In all of the different ways above described of carrying out my process the paraffine is heated only slightly above its melting-point, and the paraffine-applying roller is passed with considerable speed over the sheet, so that the heat of the roller will not be communicated to the material. It is essential that the material to be coated should not be heated, as has heretofore been usual in applying paraffine, for the reason that the heating of the material will cause the paraffine to sink into the same, and in carrying out my process therefore the material is retained at a temperature lower than the melting-point of paraffine, and paper or other material is used, which has considerable thickness or body; or if the material is thin it is arranged in several layers to form a thick mass or body, so that the latter will not be heated to the melting-point of the paraffine by contact with the roll or by the application of the paraffine, but, on the contrary, will absorb heat from the paraffine and thus instantly chill the same, and thereby insure the making of a non-penetrating film or coating.

By the use of the apparatus shown in Fig. 8 paraffine may be applied to material thinner than that which can be operated upon by the machine shown in the other figures, for the reason that when the thin material is rolled into a compact roll, as shown in Fig. 8, the compact mass thus formed will retain its normally-low temperature, notwithstanding the contact of the heated roller therewith, so that the paraffine applied by said roller to the surface of the outer layer will be chilled, and will thereby be caused to remain on the surface of the external layer in the same manner as when operating upon a sheet having in itself sufficient thickness or body to quickly chill the melted paraffine. In other words, the compacted mass shown in Fig. 8 operates in the same manner as a single thick sheet as far as the retention therein of a temperature sufficiently low to chill the paraffine is concerned.

An obvious advantage gained by securing the frame-pieces E E to the bottom of the tank or within the side walls thereof and locating the elevating devices for the paraffine and all other operative parts within the sides of the tank in the manner illustrated is that all paraffine which escapes or flows from the rolls, the paraffine-elevating devices, and other parts is thereby retained within the tank.

I claim as my invention—

1. The method of coating absorbent materials with paraffine, which consists in transferring liquid paraffine from a surface or roller coated therewith by passing the material under pressure over said surface or roller when the said surface or roller and the paraffine thereon are at a temperature near the melting-point of the paraffine and when the material is at such temperature lower than the melting-point of the paraffine that it will chill the paraffine and thus prevent the latter

from being absorbed by the material, substantially as described.

2. The method of coating absorbent materials with paraffine, which consists in transferring liquid paraffine from a surface or roller coated therewith by passing the material under pressure and at a speed not less than one hundred and fifty or more than two hundred and fifty feet per minute over said surface or roller when the said surface or roller and the paraffine thereon are at a temperature near the melting-point of the paraffine and when the material is at such temperature lower than the melting-point of the paraffine that it will chill the paraffine and thus prevent the latter from being absorbed by the material, substantially as described.

3. A machine for coating absorbent materials with paraffine, consisting of two opposing rolls placed one above the other, a tank for paraffine, located below the lowermost roll, a trough for supplying paraffine to the uppermost roll, and means for elevating the liquid paraffine from the said tank to the trough, substantially as described.

4. A machine for coating absorbent materials with paraffine, consisting of two opposing rolls, and means for feeding liquid paraffine to each of said rolls, said rolls being set at a distance apart greater than the thickness of the coatings of liquid paraffine on both of the rolls, so that the coatings of the two rolls are separate from each other when no paper is being fed between the rolls.

5. A machine for coating absorbent materials with paraffine, consisting of two opposing rolls, one located above the other, a paraffine-tank located beneath the lowermost roll, a trough for supplying paraffine to the uppermost roll, and a pump the inlet-passage of which communicates with said tank and the outlet-passage of which discharges into the said trough, substantially as described.

6. A machine for coating absorbent materials with paraffine, consisting of two opposing rolls, one located above the other, a paraffine-tank located beneath the lowermost roll, a trough for supplying paraffine to the uppermost roll, and a pump the inlet-passage of which communicates with said tank and the outlet-passage of which discharges into the said trough, said pump being actuated by or from the shaft of one of said rolls, substantially as described.

7. The combination, with the frame of a paraffining-machine comprising a horizontal cross-bar J³, of two opposing rolls mounted in the frame, a paraffine-tank located beneath the lowermost roll, a trough for supporting paraffine to the uppermost roll, means for elevating the liquid paraffine from the tank to the said trough, and means for adjusting the said trough relatively to the upper roll, consisting of screw-shafts passing through said bar J³ and engaging the said trough, and set-screws also passing through said bar J³ and bearing against the trough, substantially as described.

8. The combination, with the machine-frame and two opposing rolls, one of which is mounted in stationary bearings on the frame, of sliding blocks affording bearings for the other roll, levers pivoted on the frame and engaging said sliding blocks, and screw-shafts engaged with a part of the said frame and with the said levers for moving said blocks to separate the rolls, and springs applied between a part of the frame and said blocks for throwing the rolls together, substantially as described.

9. The combination, with the machine-frame and two opposing rolls, one of which is mounted in stationary bearings on the frame, of sliding blocks affording bearings for the other roll, levers pivoted on the frame and engaging said sliding blocks, and screw-shafts engaged with a part of the said frame and with the said levers for moving said blocks to separate the rolls, and springs applied between a part of the frame and said blocks for throwing the rolls together, and springs applied between a stationary part of

the frame and said levers, substantially as described. 25

10. A machine for coating absorbent materials with paraffine, consisting of two opposing rolls placed one above the other, a tank for paraffine located below the lowermost roll, a trough for supplying paraffine to the uppermost roll, means for elevating the liquid paraffine from said tank to the trough, and bearings or supports for said rolls, said tank being constructed to afford support for all of said parts and having its margins extended outside of or beyond the same to retain within the tank all paraffine escaping from the several operative parts, substantially as described. 30 35 40

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WARREN B. HOWE.

Witnesses:

C. CLARENCE POOLE,
TAYLOR E. BROWN.