Oct. 17, 1933. S. LIPSIUS 1,930,814

POWDERING APPARATUS

Filed March 13, 1931 3 Sheets-Sheet 1

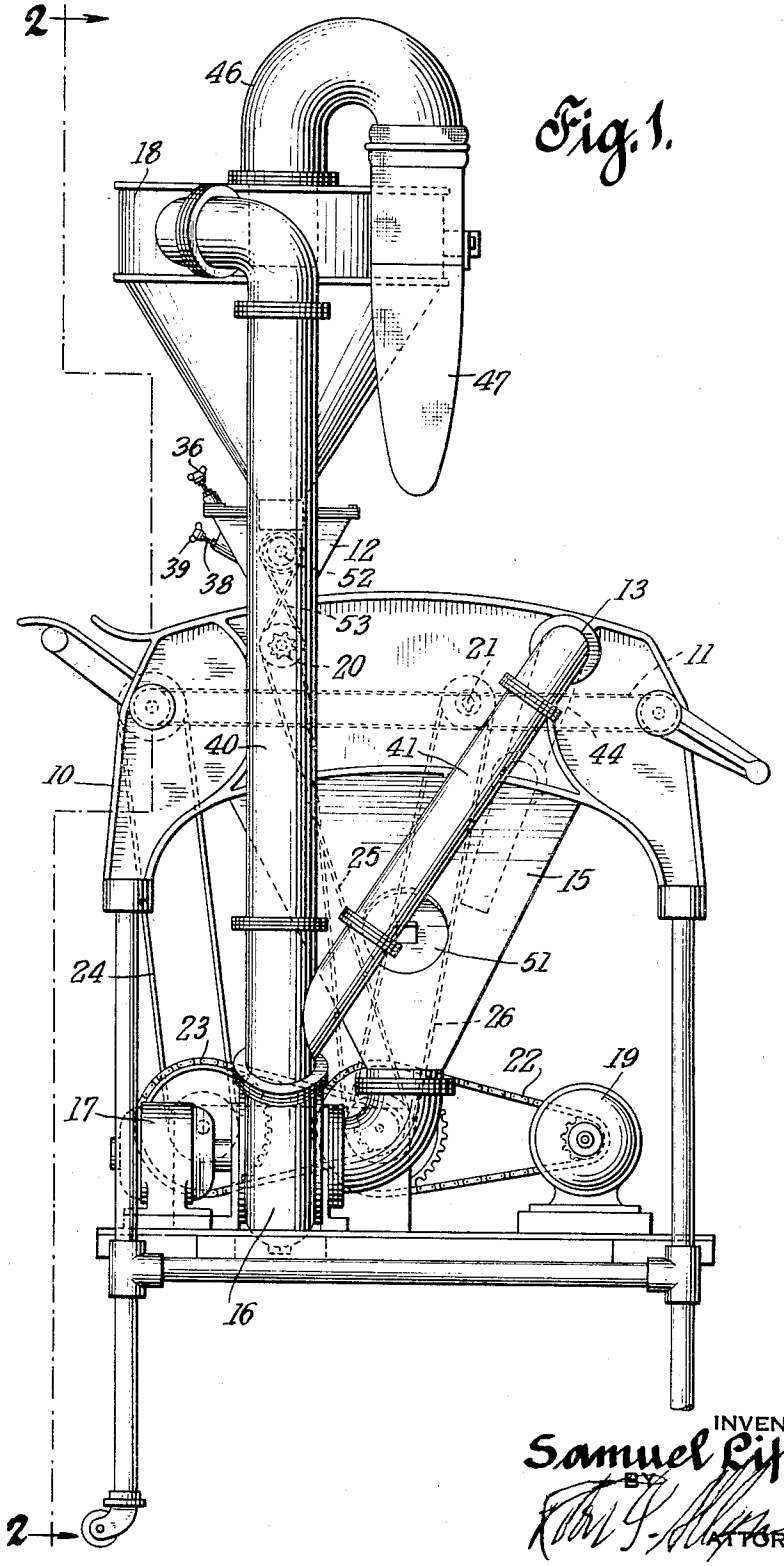


Fig. 1.

INVENTOR
Samuel Lipsius
BY
ATTORNEY

Oct. 17, 1933. S. LIPSIUS 1,930,814

POWDERING APPARATUS

Filed March 13, 1931 3 Sheets-Sheet 2

Fig. 2.

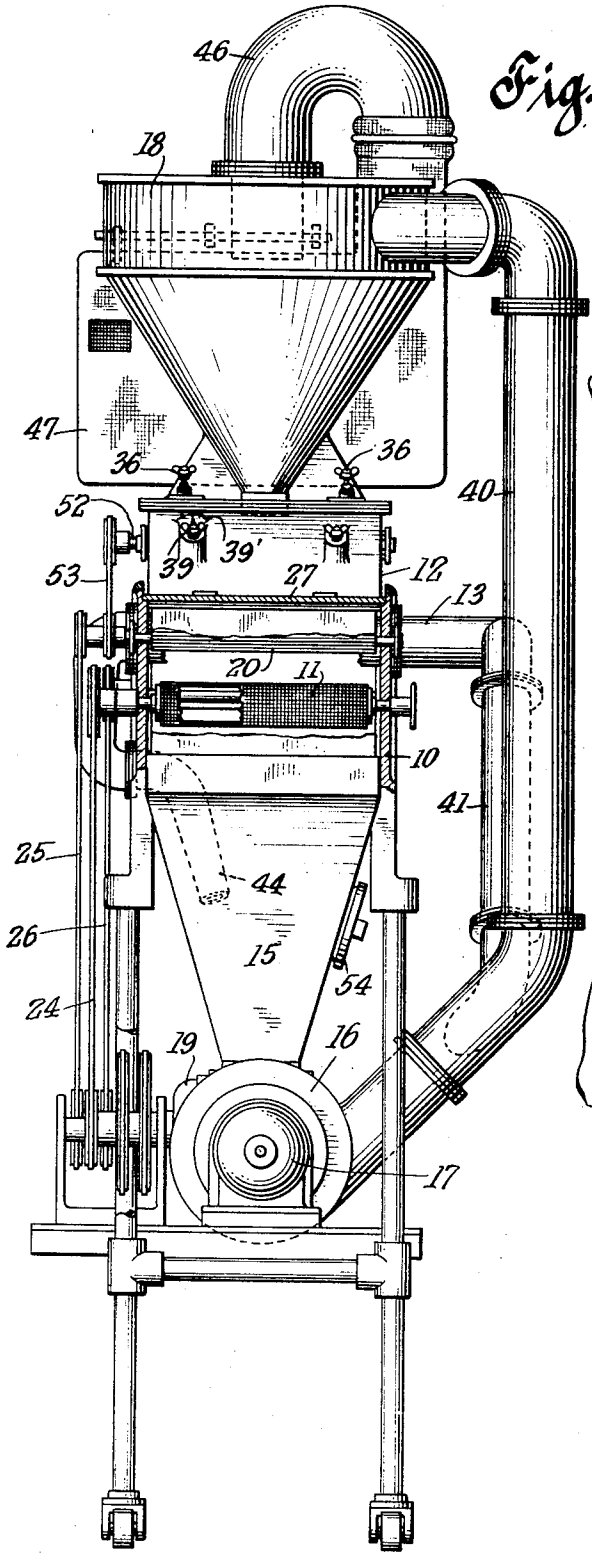
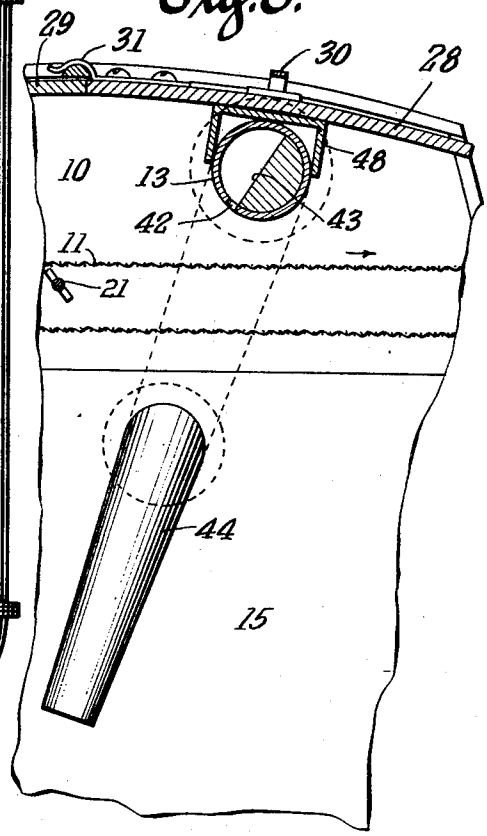


Fig. 3.



INVENTOR
Samuel Lipsius
BY
ATTORNEY

Oct. 17, 1933. S. LIPSIUS 1,930,814

POWDERING APPARATUS

Filed March 13, 1931 3 Sheets-Sheet 3

Fig. 4.

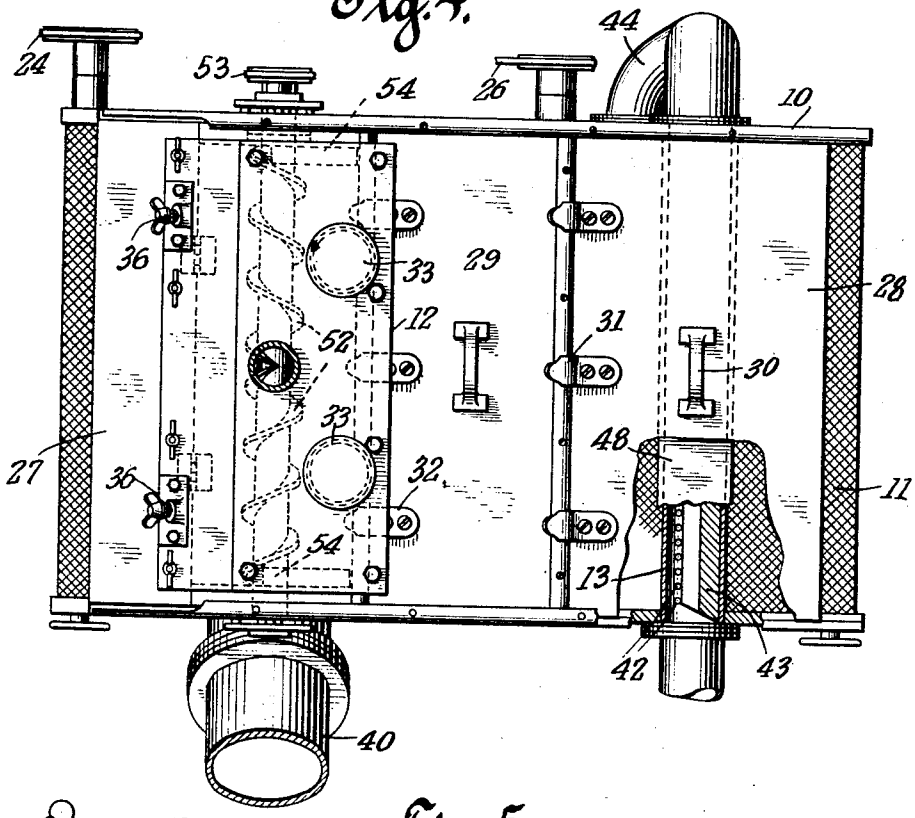


Fig. 5.

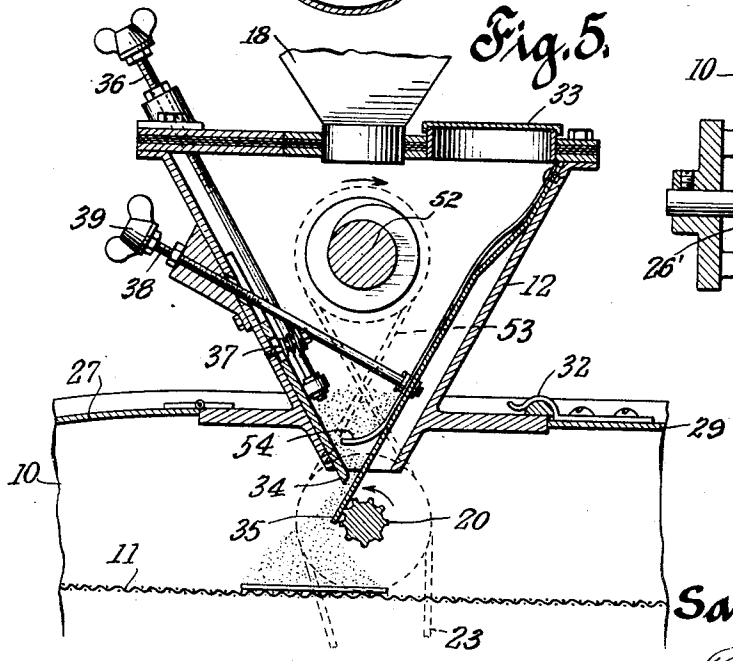
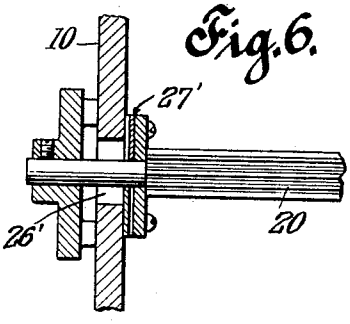


Fig. 6.



INVENTOR
Samuel Lipsius
BY
ATTORNEY

Patented Oct. 17, 1933

1,930,814

UNITED STATES PATENT OFFICE

1,930,814

POWDERING APPARATUS

Samuel Lipsius, New York, N. Y.

Application March 13, 1931. Serial No. 522,327

11 Claims. (Cl. 91—59)

My invention relates to machines for automatically applying powder to printed sheets such for instance as in the manufacture of what is commonly termed "embossed" or "raised" printing or "thermography".

One object is to provide apparatus of a simple and compact form capable of readily applying powder to the previously printed sheets and completely removing the excess of powder from the unprinted portions of the sheet without wasting powder.

Another object is to provide convenient means for regulating the deposit of powder on the sheets.

Another object is to provide means for maintaining a uniform feed and a uniform action of the removal of excess powder.

Another object is to provide means for automatically applying the powder and returning to the feed the powder which has been removed from the unprinted portions of the sheet.

Another object is to provide convenient means for inspecting the interior of the machine.

Another object is to prevent the escape of the fine powder from the final exhaust pipes.

Other objects will be apparent from the following specification and claims.

In its preferred form the complete machine includes a housing containing a suitable form of mesh-like conveyor for the printed sheets, a hopper with means for depositing powder on the conveyor, a collector beneath the conveyor, a suction blower for removing excess powder from the sheets and returning the collected excess powder to the hopper through a cyclone separator. Also means for vibrating the conveyor in the path of the air blast to loosen the powder and also means in the hopper for spreading or distributing the powder therein. Details of the construction and detailed improvements will be understood from the accompanying drawings.

Fig. 1 is a side view of a machine embodying one form of my invention.

Fig. 2 is a front view and partial section.

Fig. 3 is a fragmentary longitudinal section showing the cleaner pipe.

Fig. 4 is a horizontal section and plan.

Fig. 5 is a longitudinal vertical section of the powder supply hopper and conveyor.

Fig. 6 is a fragmentary detail view of the vibrator shaft.

The casing 10 may be of any suitable construction and the conveyor 11 is suitably mounted to travel through the casing and carry the sheets which are fed to it and to eject the sheets after they are powdered. The powder is fed on to the sheets from a suitable hopper 12 arranged above the conveyor. Of course the powder adheres to the tacky printed portions of the sheets in the customary manner and the excess powder is removed by air blasts from the transverse pipe 13. The powder which does not adhere to the wet printed surface settles in the tapered collector 15 from which it is blown by the suction blower 16 driven by motor 17. This blower forces the collected powder upwardly to the cyclone separator 18 which deposits the powder into the hopper 12 so as to return to the feed hopper substantially all of the powder which has not been used. A motor 19 serves to drive the conveyor 11 and the vibrators 20 and 21 for the powder feed through a suitable train of gearing including chains and belts 22, 23, 24, 25 and 26.

The housing 10 is formed with opposed openings 26' to permit the passage of vibrator 20 and these openings are provided on the inside of the housing wall with plates and washers of any suitable type to form a tight joint as indicated at 27' (Fig. 6) preventing the escape of powder.

The inlet of the housing may be provided with a hinged cover 27 to facilitate inspection of the entrance end of the machine and to enable inspection of the operation of the depositing of powder.

The outlet end of the machine may be provided with removable covers 28 and 29 to permit access for purpose of inspection, repair and so forth. The cover 28 is provided with a handle 30 and is adapted to slide into place. The other cover section 29 is similarly constructed and slides into place and is held by clips 31. The section 28 may be held by spring clips 32. Access to the hopper may be had by removing the hand hole cover 33 so that powder can be directly inserted into this hopper.

The feed deposited powder onto the sheets is regulated by plates 34 and 35 as shown in Fig. 5. Plate 35 is vibrated by a toothed shaft 20 driven by the belt 23. The plate 34 is adjustable up and down in the hopper by means of one or more threaded rods 36 so as to vary the outlet opening between the plates 34 and 35. A spring 37 may be provided for resiliently holding the plate 34 against one side of the hopper. The plate 35 is of resilient metal and has its upper edge anchored to the hopper and its lower edge adjustable by means of the rod 38 which may pass out through one side of the hopper and be provided with an adjusting member 39. A suitable form of indicator 39' is also preferably provided operated by the ad-

justment of the rod 38. This may have a pointer movable over a graduated dial so as to show to the operator the adjusted position of the vibrating plate. It is quite desirable that such an indicator should be provided on the exterior as it is difficult to inspect the operation due to the flying powder which escapes if there is any opening of the casing while the apparatus is in operation.

The suction blower 16 has an outlet pipe 40 and a branch 41 to the transverse blower pipe 13 which latter has a row of openings 42 in its lower edge arranged to direct air currents to the sheets as they pass by on the conveyor 11. This pipe 13 is preferably so shaped as to avoid the provision of any inner or outer pocket which would tend to collect powder. In the form shown the pipe 13 is provided with an inclined inner wall 43 the lower edge of which is in line with the edges of the outlets 42. In the absence of such a provision powder is likely to collect in this pipe 13 and from time to time pile up inside the pipe and finally block the outlets 42. I also prefer to provide a relief outlet 44 at the outlet end of the pipe 13 which member 44 is tapered and has a discharge orifice of smaller diameter than the pipe 13 which communicates with the interior of the collector 15. (Fig. 3). The effect of this return connection is to prevent the accumulation of powder in the outer end of the pipe 13.

The main pipe 40 connected to the blower 16 serves to return most of the powder by air current into the upper centrifugal or cyclone type separator 18 where it is allowed to fall back into the hopper 12. The air relief outlet 46 from the cyclone 18 is provided at its lower end with a suitable form of collecting and air relief member. This may be in the form of a cloth air bag 47 or another cyclone type separator (not shown).

As the powder sometimes sticks to the blank paper and to the conveyor it is very desirable to provide a vibrator 21 beneath the upper rim of the conveyor to shake the conveyor and sheets as they approach and pass the air blast from openings 42 and thus make it easier for the air currents to remove the unwanted powder.

The top of the transverse blower pipe 13 is covered by a shield or plate 48 with vertical edges to prevent the collection of powder on the top of the pipe.

A screw threaded shaft 52 driven by belt 53 serves to spread the powder toward the opposite sides or ends of the hopper 12 and a flat plate having a curved bottom end 54 positioned on the inside of the hopper and at each side thereof. The bottom end 54 is disposed above and adjacent the outlet of the hopper and prevents blasts of air from the hopper from passing downwardly directly through the outlet at such point and deflects the same.

The collector 15 may be provided with a hand hole having a cover 51 for convenient access.

In operation of the machine, sheets are fed in by hand or automatically from a press and deposited on the conveyor 11 which carries them through and discharges them into a suitable receptacle or preferably upon the conveyor of a heater (not shown). When the machine is in operation the toothed shaft 20 vibrates the plate 35 and thus permits powder to be deposited on to the travelling sheets.

As the sheets pass along over the vibrator 21 they are shaken to loosen the powder as they reach the pipe 13 and currents of air are directed in an inclined direction downwardly and against the direction of movement of the sheets. These air currents remove from the sheets such powder as has not adhered to the printed portions. The powder which does not remain on the sheets settles into the tapered collector 15 and passes into the suction inlet of the blower 16. Most of this powder is blown by the great velocity of air created by the blower 16 directly upwardly through the main pipe 40 to the cyclone separator 18 where it returns to the hopper 12. As the pipe 13 receives its air pressure from the branch pipe 41 connected to the blower some powder necessarily is introduced into pipe 13. This powder, however, is moving rapidly and most of it goes out the end and down through pipe 44 into the collector 15. There is little opportunity for any which escapes through openings 42 to rest on the sheets which are travelling against the path of the air current beneath the pipe 13.

The result is that sheets pass out of the machine properly powdered and without excess which would ruin the sheets. Such a machine can operate continuously for a long time with a very small supply of powder since there is no waste and since the unused powder is always returned to the supply hopper.

I claim:

1. A sheet powdering machine comprising a housing, a conveyor traveling in the housing, a powder distributing hopper arranged to distribute powder above the conveyor, a collector beneath the conveyor, a separator arranged to discharge into the hopper, a suction blower having conduits connected to the collector and the separator, an air blast cleaning pipe arranged above the conveyor and having one end connected to the outlet of the suction blower, and a return connection from the opposite end of the cleaning pipe to said collector beneath the conveyor, and a vibrator for the conveyor arranged adjacent the path of the air blast.

2. A sheet powdering machine comprising a housing, a conveyor traveling in the housing, a powder distributing hopper arranged to distribute powder above the conveyor, a collector beneath the conveyor, a suction blower and conduits connected to the collector and the hopper, an air blast cleaning pipe arranged above the conveyor and having one end connected to the outlet of the suction blower, a return connection from the opposite end of the cleaning pipe to said collector beneath the conveyor, and means for vibrating said conveyor adjacent the path of the air blast.

3. A sheet powdering machine comprising a housing, a conveyor traveling in the housing, a powder distributing hopper arranged to distribute powder above the conveyor, a collector beneath the conveyor, a separator arranged to discharge into the hopper, a suction blower having conduits connected to the collector and the separator, an air blast cleaning pipe arranged above the conveyor and having one end connected to the outlet of the suction blower, and a return connection from the opposite end of the cleaning pipe to said collector beneath the conveyor.

4. In an apparatus of the character described, a conveyor, a hopper for distributing powder on the moving work sheets, a transverse blow pipe positioned above and in the path of the travelling work sheet for removing excess powder therefrom when passing under said pipe, a collector beneath said conveyor, a by-pass pipe extending from one end of said blow pipe to the collector, and an

air conduit and blower for returning powder from the collector to the hopper.

5. A powdering machine comprising a housing, a conveyor for sheets in the housing, a hopper for depositing powder upon said sheets, a blower pipe above the conveyor for removing excess powder, an air blast device connected to said pipe, a collector beneath said conveyor, and a pipe connecting said blower pipe with said collector.

6. In a powdering apparatus of the character described, a casing, a conveyor, means for distributing powder on the moving work sheets, a transverse blow pipe positioned above and in the path of the travelling work sheet for removing excess powder therefrom when passing under said pipe, and a by-pass pipe extending from the outlet end of said blow pipe to permit flushing of said blow pipe longitudinally.

7. Powdering apparatus comprising a housing, a conveyor travelling in said housing, a powder distributing hopper arranged above said conveyor, a powder distributing shaft having oppositely disposed screw threaded portions in said hopper, means for rotating said shaft, a collector beneath said conveyor, means for removing excess powder from sheets on said conveyor, air blast means for returning powder from the bottom of the collector to said hopper above said distributing shaft, and a guard and deflecting plate at each end of said shaft and adjacent the hopper outlet.

8. Powdering apparatus of the character described, including means for distributing powder on the work sheets, a blowing device including a perforated pipe for removing excess powder and an inclined wall inside said pipe with its lower edge adjacent the perforations.

9. In an apparatus of the character described, a housing, a conveyor belt movable beneath the roof of said housing, a hopper for distributing powder on the sheets on said belt, a blower pipe positioned above said belt for removing excess powder from the sheets and plates extending from the roof of said housing downwardly of the sides of said pipe to prevent collecting of powder between said pipe and roof.

10. In a sheet powdering machine a casing, a conveyor movable therein, means for distributing powder on the sheet on the conveyor, a transverse air blast pipe arranged in the casing, a movable cover on the casing and a shield interposed between said cover and the top of said pipe to prevent the accumulation of powder thereon.

11. A sheet powdering machine comprising a casing, a conveyor movable therein, a powdering device arranged above the conveyor, a collector arranged below the conveyor, means for returning the powder from the bottom of the collector to said hopper, air blast means including a perforated pipe arranged above said conveyor, said pipe having an inclined wall leading to the outlet to prevent the accumulation of powder in said pipe.

SAMUEL LIPSIUS.