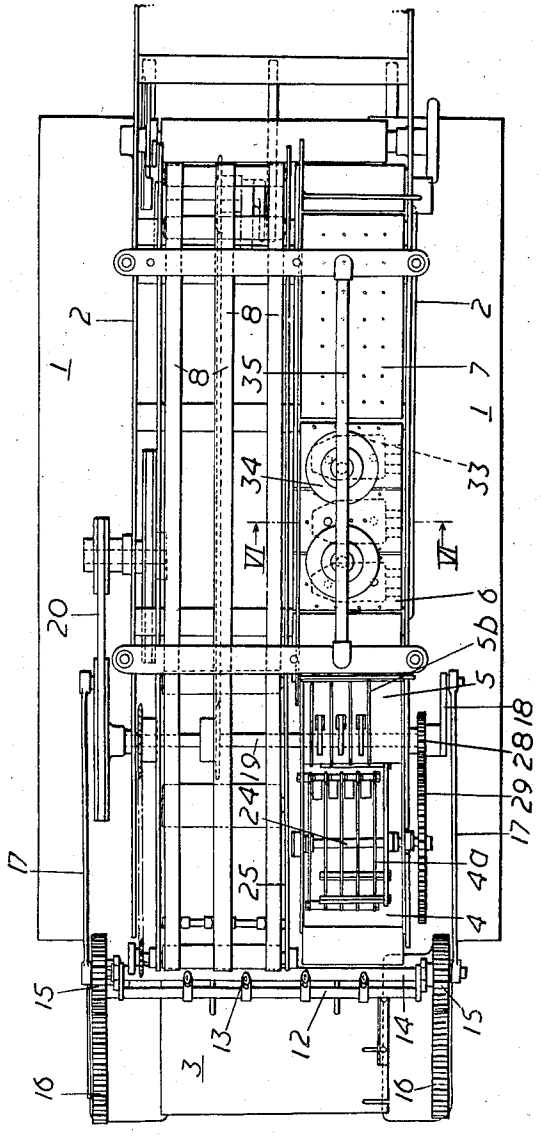
Sept. 29, 1959 D. GLADWELL 2,906,240

MACHINE FOR APPLYING POWDERS TO PRINTED SHEETS

Filed Jan. 3, 1957 4 Sheets-Sheet 1

FIG. 1.



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MACHINE FOR APPLYING POWDERS TO PRINTED SHEETS

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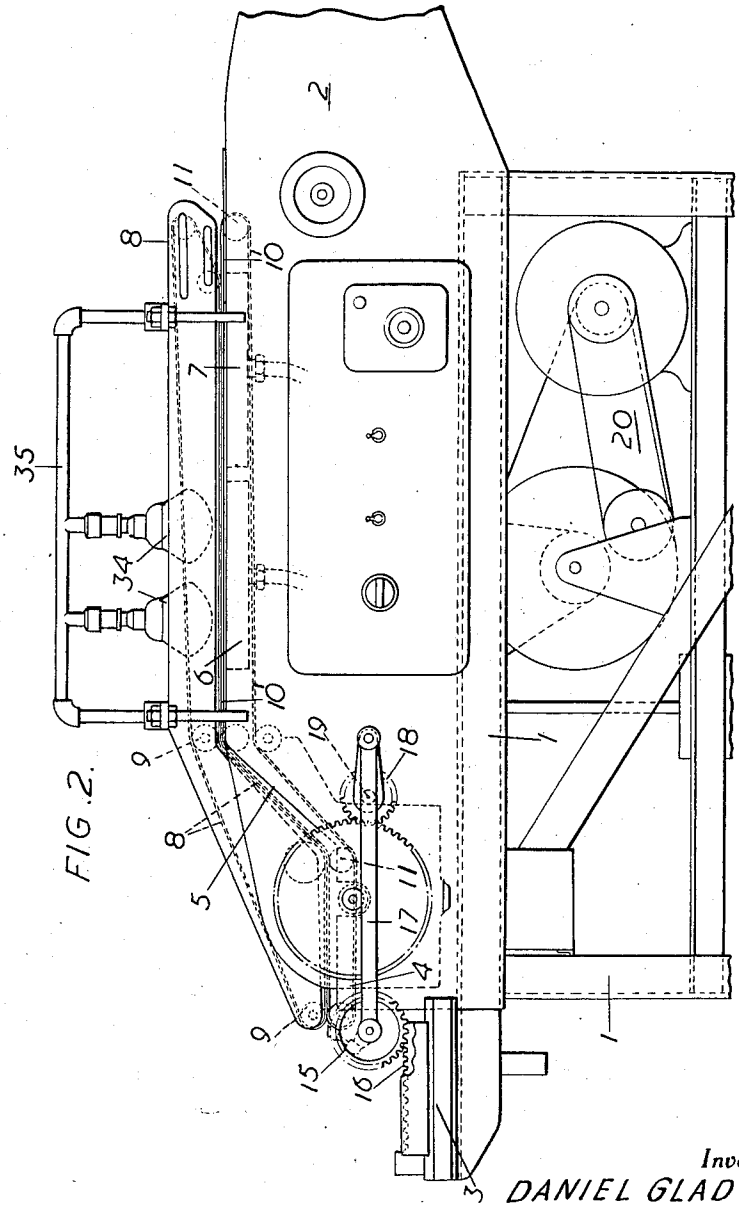


FIG. 2.

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MACHINE FOR APPLYING POWDERS TO PRINTED SHEETS

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FIG 4.

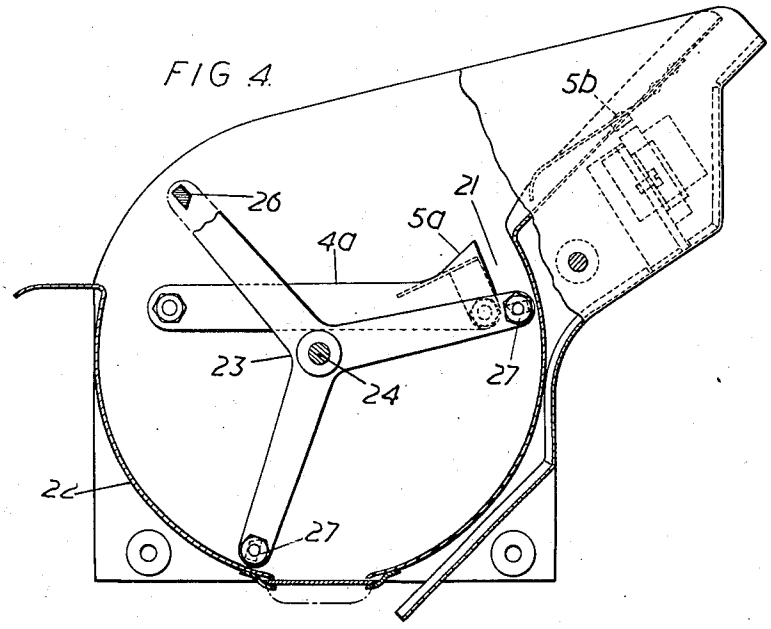
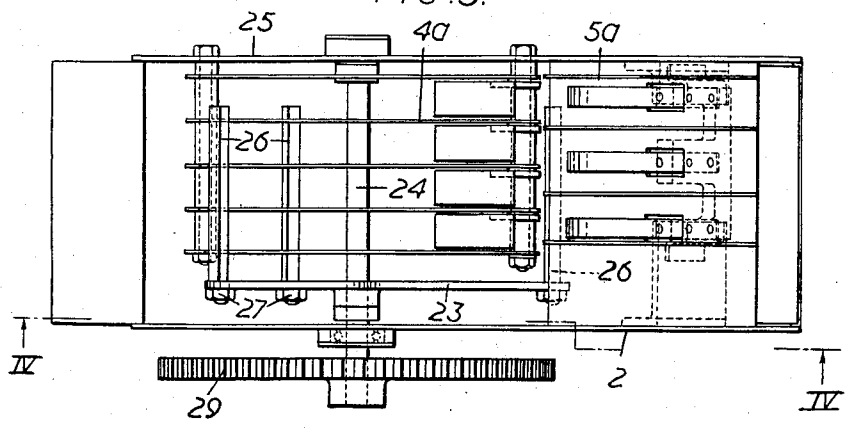


FIG. 3.



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MACHINE FOR APPLYING POWDERS TO PRINTED SHEETS

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FIG. 5.

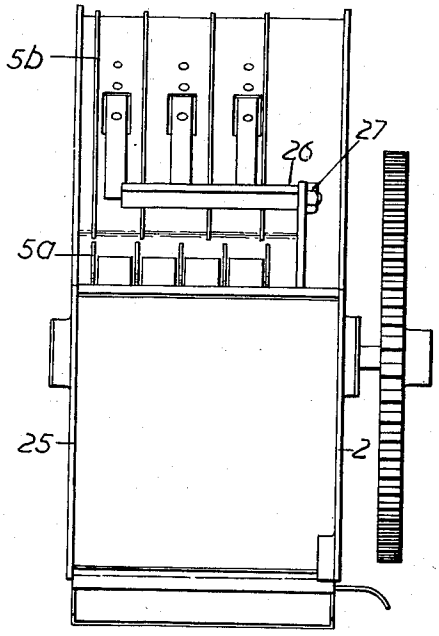
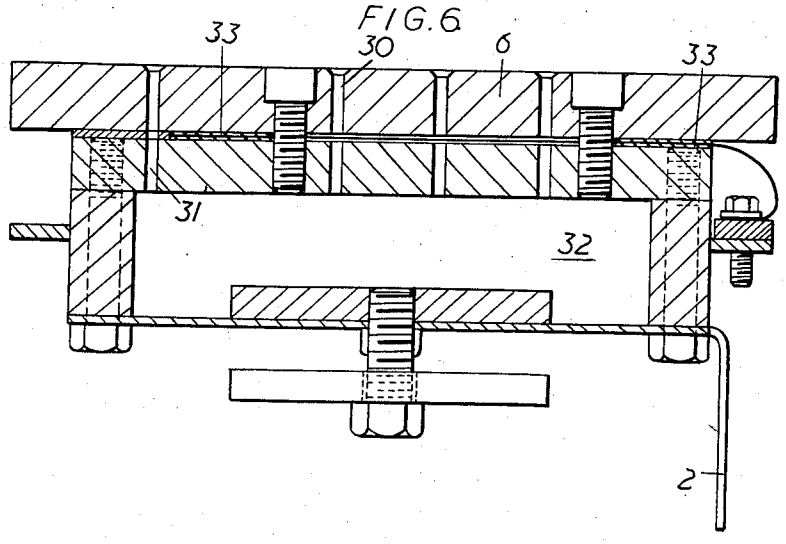


FIG. 6



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United States Patent Office 2,906,240
Patented Sept. 29, 1959

2,906,240

MACHINE FOR APPLYING POWDERS TO PRINTED SHEETS

Daniel Gladwell, Woodford, England, assignor to The Selwyn Press Limited, London, England

Application January 3, 1957, Serial No. 632,282

8 Claims. (Cl. 118—641)

This invention relates to a machine by which powder is deposited on to the freshly printed surfaces of sheets from a powder container located below the path of travel of the sheets through the machine, and is distributed over the surfaces of the sheets.

More especially the invention is concerned with the application of fusible, thermo-setting resinous powders to freshly printed sheets to attain relief printing without the aid of costly dies; but it may include the application of other powders, such as bronzing powders and chalk or like powders.

The object of the invention is to provide improved and simplified means for picking up the powder from the container and depositing it on to the sheets without the possibility of any of the moving parts of the machine becoming clogged with the distributed powder and thereby rendering the machine inoperative.

To the attainment of this object the invention provides a machine for applying powders to freshly printed sheets, comprising, in combination, conveyor means including a grid affording an inclined path of travel for the sheets one following another, a powder container below said grid, a member mounted at one side of said grid for rotation in a substantially vertical plane, powder pick-up arms projecting laterally from and rotatable with said member in a path circumscribing said grid and dipping into said container, and mechanism for operating said conveyor means and for rotating said member in timed relationship whereby said arms pick up predetermined doses of powder from said container and deposit same successively one dose over each sheet travelling along said grid, any unused powder from each dose returning through said grid into said container.

Each pick-up arm may be of irregular triangular or polygonal section having a multiplicity of faces and may be turnably attached at one of its ends to said rotatable member thus affording a plurality of faces each of a different total area from the others, any of which faces can be made to act as the powder pick-up and carrier face of the arm by appropriate setting of the arm, the amount of powder deposited by each arm being thereby made adjustable.

The sheet conveyor means may include a perforated heated bed as a continuation of the path afforded by the grid, the sheets being caused, when traveling along this bed, to make intimate contact with the surface of the bed by suction effective to remove air between the sheet and the bed. Since air, which is a relatively poor-conducted of heat, is removed, a more rapid and effective heating (by contact) is attained. Infra-red heating may also be applied to the upper surface of each sheet as it travels over the heated bed.

By way of example an embodiment of the invention, more particularly for applying powder to printed letter heading, is illustrated on the accompanying drawings and will now be described with reference thereto.

Fig. 1 is a plan of the illustrated machine.

Fig. 2 is a fragmentary elevation of the machine.

Figs. 3, 4 and 5 show details of the powder-applying arrangement, Fig. 3 being a plan, Fig. 4 a sectional elevation on line IV—IV of Fig. 3, and Fig. 5 a front view.

Fig. 6 represents a section on line VI—VI of Fig. 1 of the perforated heated bed.

As shown by Figs. 1 and 2, the machine comprises a base frame **1** having two laterally spaced upstanding side cheeks **2**, a platform **3** at the front end of the frame for supporting a pile of printed sheets (printed-side down) and, between said side cheeks, first a powder-applying zone affording a horizontal support **4** followed by an upwardly inclined support **5** for the sheets as they are caused to travel successively through the machine, next a horizontal heated bed **6**, and in line with the latter a cooled bed **7**. Co-acting upper and lower endless conveyor bands **8**, **10** and rollers **9**, **11** suitably driven convey the sheets successively through the machine.

Any appropriate mechanism is provided for transferring the sheets one at a time from the pile of sheets supported on the platform **3** to the support **4**. The illustrated mechanism comprises a suction tube **12** having suction nozzles **13**, this tube being carried by an axle **14** having toothed gears **15** that engage toothed racks **16** on the top of the machine frame **1**. The axle **14** is operatively connected by levers **17** and cranks or eccentrics **18** with a shaft **19** which is arranged to be driven, through belt and pulley gearing, denoted **20**, from a power source such as an electric motor. When the axle **14**, which is both turned and reciprocated, is moved to its extreme forward position over a pile of sheets on the platform **3** suction is applied, under control of an automatically acting valve, through the nozzles **13** to the extreme forward edge of the topmost sheet and then, as the axle moves back, this sheet is rolled over and fed, printed side up, between the co-acting surfaces of the upper and lower conveyor bands **8** and **10** first on to the supports **4**, **5** and then onwards through the machine.

Associated with the supports **4**, **5** there is a powder-applying arrangement the details of which are clearly shown by Figs. 3, 4 and 5. This arrangement includes as a part of the aforesaid horizontal support **4**, a horizontal grid *4a* with an upwardly inclined portion *5a*; it also includes a grid *5b* virtually forming a part of the inclined support **5**. However, it is to be observed that there is a gap **21** between the parts *5a* and *5b* for a purpose to be mentioned later. Reference **22** denotes a powder container below the grid *4a*. A spider **23** fixed on a shaft **24** journalled in bearings in one of the side cheeks **2** and in an intermediate cheek **25**, has attached to each of its limbs a powder pick-up arm **26** of irregular polygonal cross-section having a multiplicity of pick-up faces for the purpose previously indicated. Each arm is screw-threaded at one end which is inserted through a hole in the pertaining limb of the spider and held therein by a nut **27**. The arms **26** project horizontally across the grid *4a*. The spider shaft **24** is driven from the previously mentioned shaft **19** through a toothed wheel **28** on this shaft (see Fig. 1) and a toothed wheel **29** on said spider shaft. As the spider **23** is rotated (anticlockwise in Figs. 2 and 4) each arm **26** passes downwards beyond the forward end of the grid *4a*, enters the powder within the container **22**, picks up a quantity of powder on one of its faces, and then passes upwards through the gap **21** and above a printed sheet advancing along the support **4** and grid *4a*. As the disc continues to rotate the face of this arm **26** whereon rests a quantity of powder assumes such a forwardly inclined position that said powder is deposited automatically, by gravity on to the sheet. Then, as the sheet advances up the inclined support **5**, *5b*, the deposited powder is spread

evenly over the freshly printed matter to which it adheres. Any surplus deposited powder falls through the grids back into the powder container 22 for re-use.

From the inclined support 5, 5b each powder-treated sheet is conveyed along the bed 6 where it is heated to dry the printed matter and cure the adhering powder as required to attain the effect of relief printing. As appears clearly from Fig. 6, the support 6 has perforations 30 in alignment with suction openings 31 in the top wall of a suction box 32 below the bed. Electric heating elements 33 (see also Fig. 1) are housed between the bed 6 and the box 32. In the use of the machine these elements are connected to a suitable source of electricity, and suction is applied to the openings 31 and perforations 30. It follows that as each sheet advances over the heated bed 6, it is caused to make intimate contact with the surface of the heated bed by suction effective to remove air from between the sheet and the bed for the purpose already mentioned.

In Figs. 1 and 2 we have also shown infra-red lamps 34 for applying heat to the upper surface of each sheet as it travels along the heated bed 6. Conveniently these lamps depend from a tubular bracket 35.

Each sheet passes from the heated bed 6 to the bed 7 which may be in the form of a box through which a cooling medium is circulated. Moreover the bed 7 may have through suction passages connected with an exhauster or suction fan. In passing over the bed 7 the sheet is cooled and so passes to the rear or delivery end of the machine in non-cockled, flat condition.

Take-off mechanism forming no part of the present invention is provided at the delivery end of the machine.

It will be understood that the timing of the spider 23 and the travel of the printed sheets is so co-related that each arm 26 deposits its powder near the leading edge of an advancing sheet. By turning the arms 26 about the axes of their screw-threaded ends any of the faces of the arms, which faces are of different total areas due to the irregular polygonal cross-section of each arm, can be made to act as the powder pick-up and carrier fall. In short the amount of powder deposited by each arm is adjustable by varying the setting of the arm relatively to the spider.

Although I have described and illustrated one embodiment of the invention it will now be apparent that many constructional variations may be made within the scope of the invention as defined by the claims that follow.

I claim:

1. A machine for applying powders to freshly printed sheets, comprising, in combination, conveyor means including a grid affording an inclined path of travel for the sheets one following another, a powder container below said grid, a member mounted at one side of said grid for rotation in a substantially vertical plane, powder pick-up arms having a multiplicity of pick-up faces thereon, said arms projecting laterally from and rotatable with said member in a path circumscribing said grid, the faces of said arms dipping into said container, and mechanism for operating said conveyor means and for rotating said member in timed relationship whereby the faces of said arms pick up predetermined doses of powder from said container and deposit same successively one dose over each sheet travelling along said grid, any unused powder from each dose returning through said grid into said container.

2. A machine as set forth in claim 1, each of said powder pick-up arms being of irregular cross section whereby said plurality of faces have different total areas; and means securing each of said arms to said rotatable member for turning movement relative thereto selectively to make any of said faces the powder pick-up.

3. A machine for applying powders to freshly printed sheets, comprising, in combination, conveyor means including a grid affording an inclined path of travel for the sheets one following another and in line with said grid a perforated bed, a powder container below said grid, a member mounted at one side of said grid for rotation in a substantially vertical plane, powder pick-up arms projecting laterally from and rotatable with said member in a path circumscribing said grid, said arms having a multiplicity of pick-up faces adapted to dip into said container, mechanism for operating said conveyor means and for rotating said member in timed relationship whereby said arms pick up predetermined doses of powder from said container and deposit same successively one dose over each sheet travelling along said grid, any unused powder from each dose returning through said grid into said container, means for heating said perforated bed to dry the powder-treated sheets travelling thereon, and suction means holding said sheets in intimate air excluding contact with said bed.

4. A machine as set forth in claim 3, each of said powder pick-up arms being of irregular cross section whereby said plurality of faces have different total areas; and means securing each of said arms to said rotatable member for turning movement relative thereto selectively to make any of said faces the powder pick-up.

5. A mchine for automatically applying powders to freshly printed sheets, comprising, in combination, a support for a pile of freshly printed sheets, sheet transfer mechanism of the suction type for successively transferring the sheets from the pile support into the machine, conveyor means including a grid affording an inclined path of travel for the transferred sheets, a powder container below said grid, a member mounted at one side of said grid for rotation in a substantially vertical plane, powder pick-up arms projecting laterally from and rotatable with said member in a path circumscribing said grid having a multiplicity of pick-up faces adapted to dip into said container, and means for operating said sheet transfer mechanism and said conveyor means and for rotating said member in timed relationship whereby said faces of said arms pick up predetermined doses of powder from said container and deposit same successively one dose over each sheet travelling along said grid, any unused powder from each dose returning through said grid to said container.

6. A machine as set forth in claim 5, wherein each of said powder pick-up arms is of irregular cross section whereby said plurality of faces have different total areas; and means securing each of said arms to said rotatable member for turning movement relative thereto selectively to make any of said faces the powder pick-up.

7. A machine for automatically applying powders to freshly printed sheets, comprising, in combination, a support for a pile of freshly printed sheets, sheet transfer mechanism of the suction type for successively transferring the sheets from the pile support into the machine, conveyor means including a grid affording an inclined path of travel for the transferred sheets and in line with said grid a perforated bed, a powder container below said grid, a member mounted at one side of said grid for rotation in a substantially vertical plane, powder pick-up arms projecting laterally from and rotatable with said member in a path circumscribing said grid, said arms having a multiplicity of pick-up faces adapted to dip into said container, means for operating said sheet transfer mechanism and said conveyor means and for rotating said member in timed relationship whereby the faces of said arms pick up predetermined doses of powder from said container and deposit same successively one dose over each sheet travelling along said grid, any unused powder from each dose returning through said grid to said container, means for heating said perforated bed to dry the powder-treated sheets travelling thereon, and suction means holding said sheets in intimate air excluding contact with said bed.

8. A machine as set forth in claim 7, each of said powder pick-up arms being of irregular cross section whereby the plurality of faces have different total areas; and means securing each of said arms to said rotatable member for turning movement relative thereto selectively to make any of said faces the powder pick-up.

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