July 14, 1953 A. J. JENNER 2,645,529

MEASURING DEVICE FOR SPRAY APPLICATORS IN PREVENTION OF OFFSET AND THE LIKE

Filed Jan. 2, 1951 4 Sheets-Sheet 1

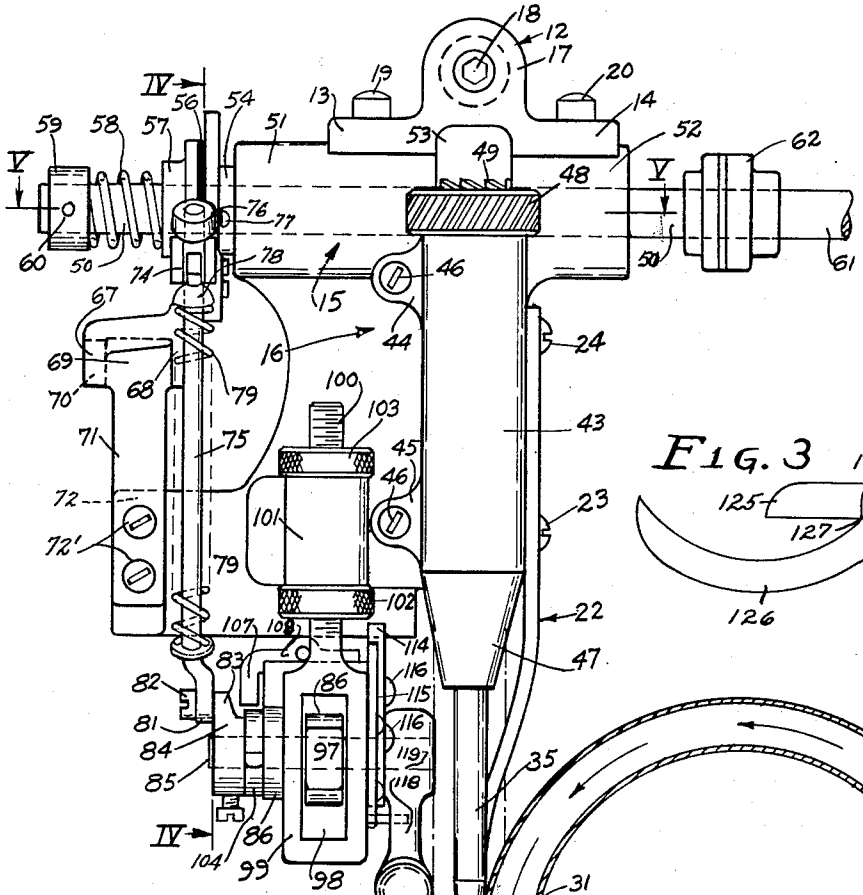


FIG. 1



FIG. 3

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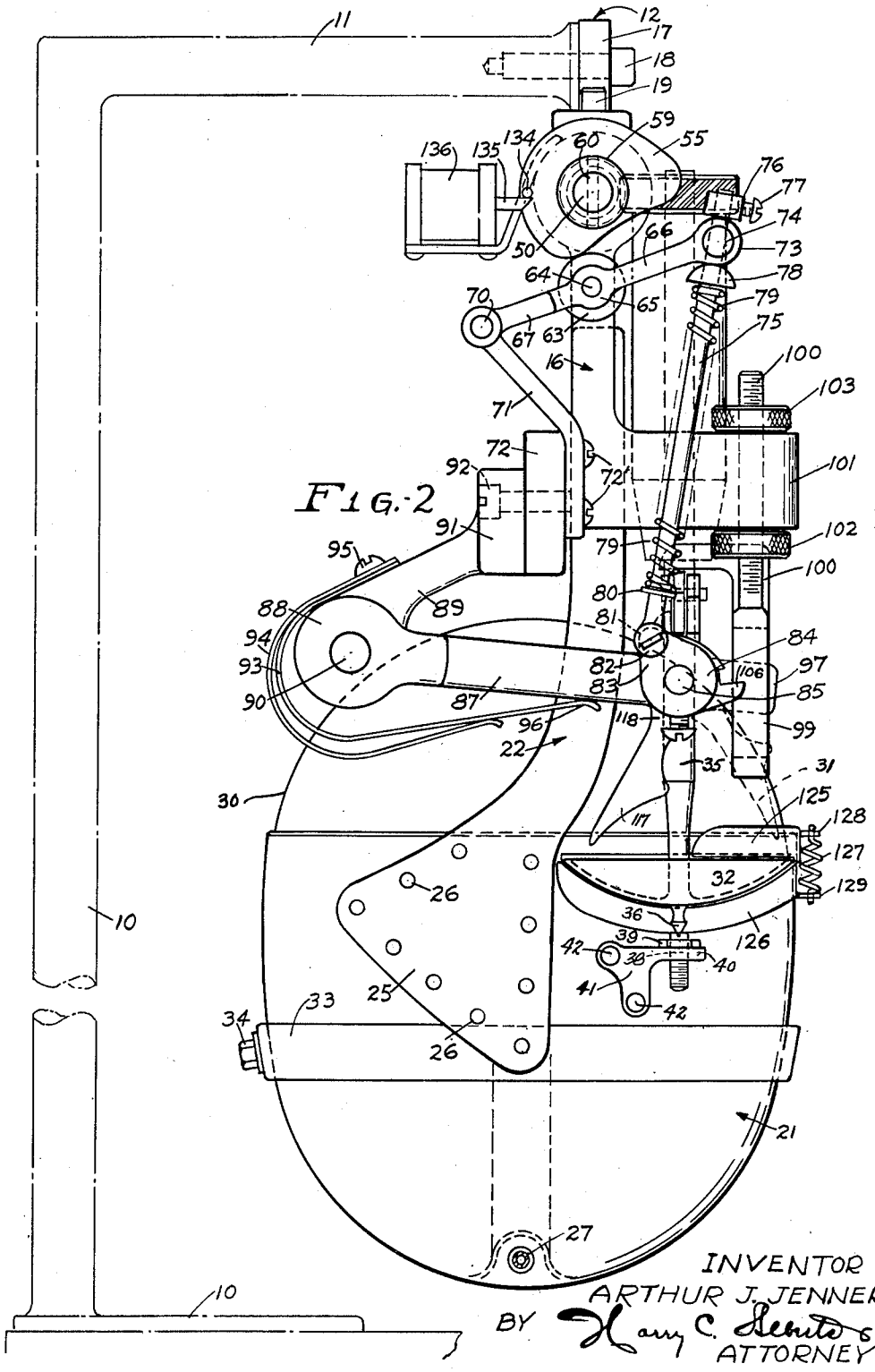



FIG. 2

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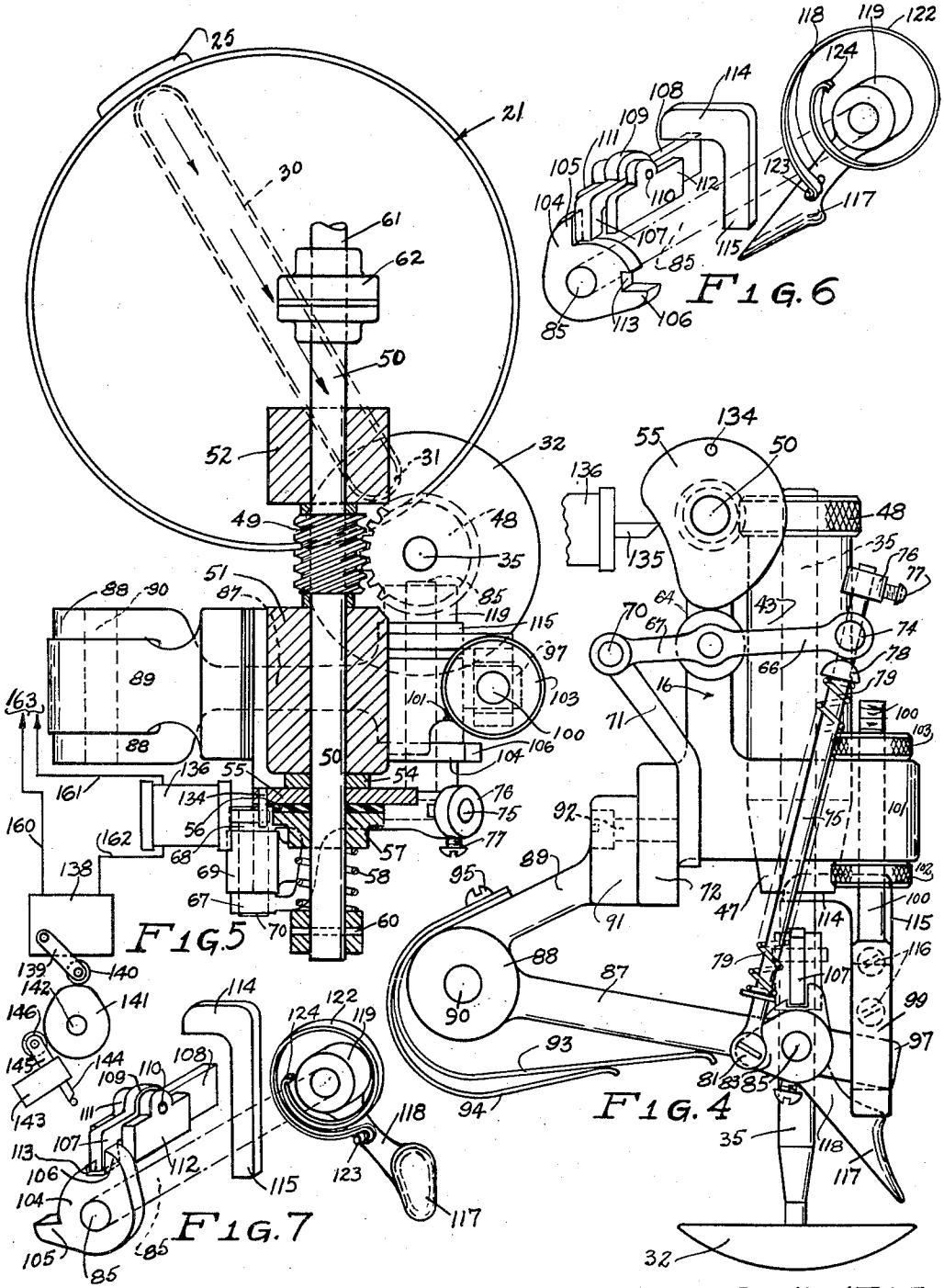


FIG. 5



FIG. 6



FIG. 7



FIG. 4

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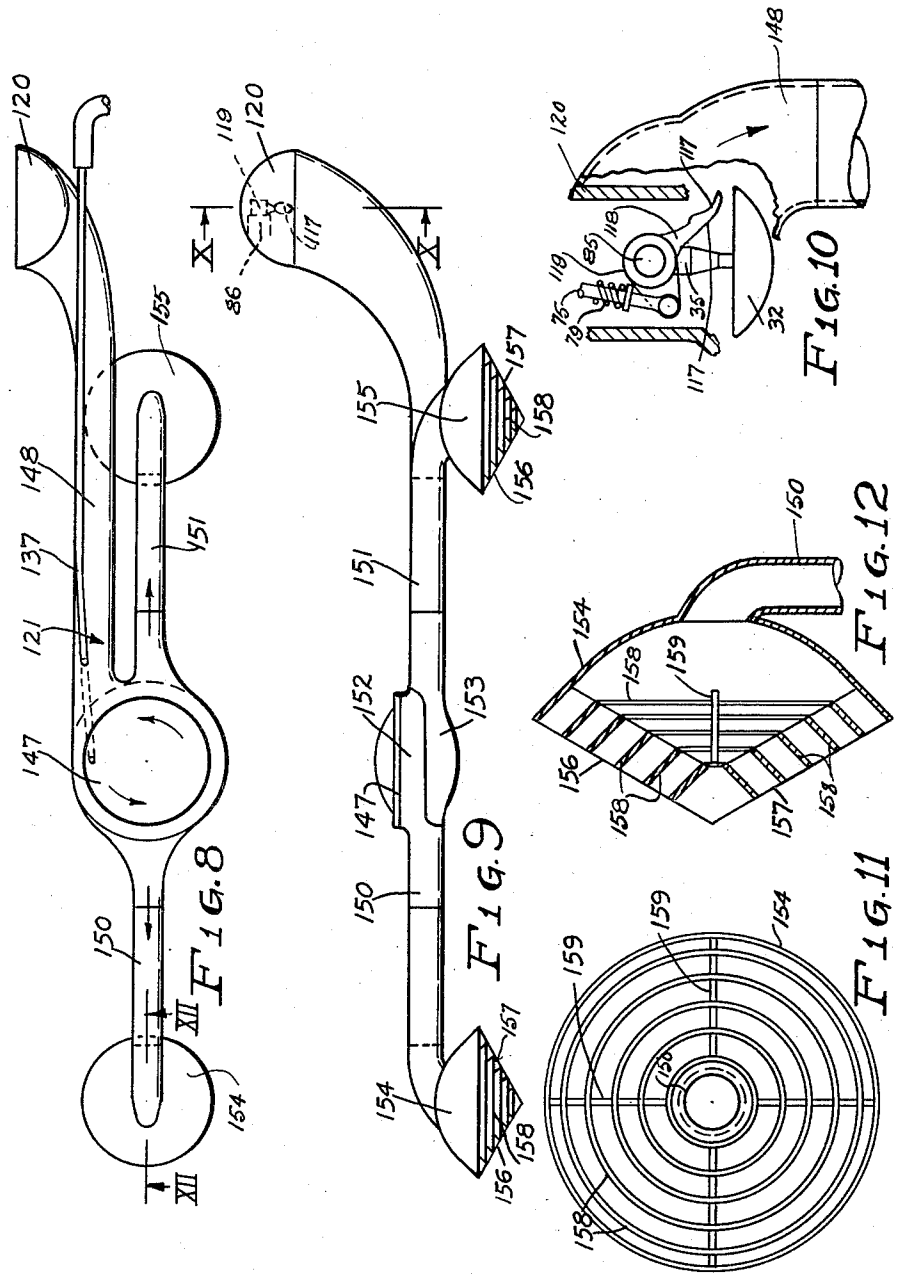



FIG. 8

FIG. 9

FIG. 10

FIG. 12

FIG. 11

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# UNITED STATES PATENT OFFICE

2,645,529

## MEASURING DEVICE FOR SPRAY APPLICATORS IN PREVENTION OF OFFSET AND THE LIKE

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Application January 2, 1951, Serial No. 203,947

25 Claims. (Cl. 302—12)

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This invention relates to spraying devices and more particularly to dry spraying devices for use in high speed printing operations for precluding printing offsets on sequentially disposed printed sheets as they are delivered by the printing press, although certain features thereof such as the measuring instrumentalities may be used with equal advantage for other purposes such as packaging predetermined units of dry substances and the like.

It contemplates more especially the provision of improved measuring instrumentalities for charging a spraying device with a predetermined quantity of dry powder, such as rice flour, and to intermix therewith a sufficient quantity of air for spraying application in uniform expansive films on successive imprinted superposed or rolled sheets to prevent offset. This application is a continuation-in-part of my copending application Serial No. 590,131, filed April 25, 1945 (now forfeited).

Numerous types of non-offset sprays have been in use. These involve gum arabic and similar transparent film producing mediums interposed between successive printing sheets or over continuous sheets rolled as they come off the press. Another common non-offset dry spray consists of rice flour which is co-mingled with or for application between the contacting surfaces of continuous rolled or successive printing sheets. The dry-non-offset spray is thought most desirable in that it is the least offensive to the attendants and the equipment of a printing plant. However, known dry spraying apparatus are not entirely suited to the prevention of printing offsets owing to the inability to control the quantum of each offset dry charge and to overcome the substantial humidification of the spraying charge prior to the application thereof between successive or continuously rolled printed sheets. A highly or substantially humidified spraying charge proves troublesome owing to the creation of smears and adhesion between successively stacked or continuously rolled printed sheets as they come off the press with the ink impressions thereon still wet.

Moreover, the amount of each powder charge or spray must be accurately measured and adjustably controlled to avoid superfluous spraying, eliminate stifling air contamination in the rooms where the machines are housed, and avoid damage to the printing machinery that would otherwise become lodged with superfluous powder, thereby causing abnormal wear and maintenance. Cleanliness and flexibility of control in the distribution of the dry film is also an important factor which insures uniformity and maximum effectiveness of the offset spray charge timed to the operation of each printing press.

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With the teachings of the present invention, the amount of the spraying charge for each application and the small or negligible humidification has been controlled to a practical degree with simplicity of structure and dependability in operation. Controlling the amount of the dry spray for each application is as important as the degree of dryness thereof unaffected by the humidity of the atmosphere and the air co-mingled therewith. Consequently, both of these accomplishments have been effected with a high degree of dependability of operation, simplicity of structure and improved results.

One object of the present invention is to simplify the structure and improve the operation of devices of the character mentioned.

Another object is to provide an improved dry spraying device to preclude printing offsets between successive sheets as they come off a printing press.

Still another object is to provide improved feeding and charging instrumentalities in dry spraying apparatus.

A further object is to provide a constantly charged vessel with a dry spraying medium and transferring a predetermined charge to a stream of air just prior to its application between successive sheets in timed relation with the printing thereof.

A still further object is to provide improved feeding, charging and spraying instrumentalities coordinated to provide an invisible film of dry powder, such as rice flour, between successive imprinted sheets.

Still a further object is to provide improved control means in conjunction with feeding, charging and spraying instrumentalities to supply an invisible dry film between imprinted sheets to eliminate offsets therein.

Other objects and advantages will appear from the following description of an illustrative embodiment of the present invention.

In the drawings:

Figure 1 is a front view in elevation of the dry powder feeding and measuring instrumentalities embodying features of the present invention.

Figure 2 is a side view in elevation of the instrumentalities shown in Figure 1, with the parts in their initial position.

Figure 3 is a side detail view in elevation of the scrapers shown assembled with the measuring vessel in Figure 2.

Figure 4 is a side detail view in elevation of the

measuring instrumentalities shown in Figure 2 with the hopper and powder conveying mechanism removed and the parts in their extreme position of movement viewed from line IV—IV of Figure 1.

Figure 5 is a sectional plan view taken substantially along line V—V of Figure 1.

Figure 6 is a perspective detail view of the measuring spoon and control mechanism with the parts positioned as shown in Figure 2.

Figure 7 is a detail perspective view similar to Figure 6 with the parts positioned as shown in Figure 4.

Figure 8 is a plan view of the spray increment distributor for directing an expansive film against the imprinted paper.

Figure 9 is a side view in elevation of the spray distributor shown in Figure 8.

Figure 10 is a fragmentary sectional view in elevation showing the relationship between the measuring and distribution instrumentalities.

Figure 11 is a bottom plan view of an individual bell distributor shown assembled in Figure 9.

Figure 12 is a sectional view taken substantially along line XII—XII of Figure 8.

The structure selected for illustration is not intended to serve as a limitation upon the scope or teachings of the invention, but is merely illustrative thereof. There may be considerable variations and adaptations of all or part of the teachings depending upon the dictates of commercial practice.

The present embodiment comprises a bracket 10 adapted to be fixed to a high speed printing press (not shown) proximate to the delivery table thereof for attachment to a complemental bracket arm 11 through the medium of suitable fasteners (Figures 1 and 3). The bracket arm 11 terminates, in this instance, in a bracket 12 cast or otherwise shaped to provide arms 13—14 for attachment to a horizontally disposed cylindrical bearing 15 comprising the top of a frame housing 16 (Figure 1 for supporting instrumentalities to be hereinafter described.

The bracket 12 has a central substantially semi-circular boss 17 which receives a screw fastener 18 therethrough to engage the horizontal bracket arm 11 (Figure 2). Threaded fasteners 19—20 extend through the bracket arms 13—14 for attachment to the horizontal top bearing 15 of the housing 16 to serve as a support therefor.

A substantially semi-spherical supply vessel or hopper 21 is supported by a bracket 22 that is attached to the housing frame 16 by means of screw fasteners 23—24 (Figure 1). The bracket 22 terminates downwardly in a substantially triangular plate 25 for attachment of the supply vessel or hopper 21 thereto by a plurality of suitable fasteners 26. The bracket 22 serves to support the hopper 21 which is kept filled with a suitable dry powder such as rice flour. The lower end of the supply vessel or hopper 21 is provided with a high pressure nozzle 27 (Figure 1) connected to a suitable compressed air supply and controlled by an automatic valve (not shown) that is operated by the printing press with which the spray mechanism described herein is fitted. The air nozzle 27 projects horizontally into and along the rounded bottom 28 of the hopper 21 and is positioned proximate to the entrance orifice 29 of an enlarged powder supply conveying tube 30.

The power supply tube is, in this instance, substantially oval and complemental to the interior cross-section of the vessel or hopper 21 to conduct the spray powder up and along the wall thereof as indicated by the arrows in Figure 1. The substantially oval spray conveying tube 30 terminates upwardly and over toward the housing 16 so that the discharge end 31 of the tube 30 terminates within the upper region of the vessel or hopper 21 for discharging the dry powder into a leveling bowl 32 supported and partially disposed through a complemental opening 33 in the supply vessel or hopper 21 (Figure 1) as will appear more fully hereinafter.



An electrical heating band or coil 33 is shaped to provide a conically shaped ring that surrounds the body of the supply vessel 21 for the connection of electrical wires to the plug 34 provided thereon. The electric heating band or coil 33 is preferably furnished with a built-in thermostat that maintains the contents of the supply vessel dry against any possible acquisition of humidity that would be detrimental thereto as an invisible offset film between successive printed sheets as they come off the printing press.

The self-leveling bowl 32 has an upwardly extending axial tubular boss 34 to which a vertical shaft 35 is attached to serve as a support therefor and impart rotation thereto as will be more fully described hereinafter. To assist in the support of the self-leveling bowl 32, an axially depending bearing point 36 is fixed to the bottom thereof for engagement in a vertical bearing 37. The vertical bearing 37 is provided with an exterior thread 38 for engagement by an adjusting nut 39. The bearing 38 projects through a horizontal arm 40 comprising part of a bracket 41 fixed to the exterior of the supply vessel 21. The vertical bearing bracket 41 is attached to the exterior of the supply vessel or hopper 21 by means of suitable fasteners 42 (Figure 1) to support the vertical bearing 37 in any desired position within the range of its exterior thread 38 to maintain and support the self-leveling bowl 32 in a desired vertical position and to compensate for wear therein.

The leveling bowl rotating shaft 35 is journalled in a vertically disposed bearing sleeve 43 attached to the housing 16 by means of bosses 44—45 formed integral therewith and receiving threaded fasteners 46 therethrough. The bearing sleeve 43 has a lower tapered extremity 47 which receives the vertical bowl rotating shaft 35 that terminates at its upper projecting end in a worm gear 48 attached for rotation with the shaft 35. The worm gear 48 meshes with a horizontal worm 49 fixed to a horizontal shaft 50. The horizontal shaft 50 is journalled in the top horizontally disposed cylindrical bearing 15 comprising the top of the housing 16. It should be noted that the top horizontal bearing 15 comprises spaced sections 51—52 to provide room 53 to accommodate the worm 49 therein and between the bearing sections 51—52. The horizontal top housing bearing sections 51—52 are maintained in rigid axial alignment by reason of their integral formation with the housing frame 16 and the attachment of the top bracket 17 thereto by means of the fasteners 19 (Figure 1).

The shaft 50 projects beyond the bearing section 51 to receive a spacer collar 54 against which a cam plate 55 is mounted on the shaft 50 (Figure 5). The cam plate 55 confronts a friction disc 56 having a plate 57 reciprocally mounted on the shaft 50 to confront the friction plate 56 that is urged in frictional contact with the cam plate 55 responsive to the urge of compression spring 58 that envelops the shaft 50 and abuts against a

collar 59 anchored to the end of the shaft 50 by means of a pin 60. The rotation of the shaft 50 is effected by a suitable source of power such as an electric motor (not shown) that is operatively connected to a shaft extension 61 (Figure 1) coupled for attachment to and rotation with the shaft 50 by means of a rigid coupler 62.

The cam plate 55 is disposed in the path of a cam follower wheel 63 that idles on a stud 64 carried by an enlarged boss 65 formed in a link 66. The link 66 has a furcated bracket arm 67—68 at one extremity thereof to receive a stationary bracket 69 therebetween for pivotal mounting upon a pin 70 that is carried by the bracket 69. The link bracket arms 67—68 are pivotally supported on the pins 70 carried by the stationary bracket 69 that has a forwardly inclined and depending plate 71 extending therefrom (Figures 1 and 2) for attachment to a horizontal bracket 72 projecting from the housing frame 16. Suitable fasteners 72' anchor the stationary bracket plate 71 to the frame plate 72. The link 66 projects forwardly to terminate in a furcated boss 73 which receives an enlarged pin 74 therethrough that is transversely apertured to accommodate a rod 75. The rod 75 projects through the pin 74 and has a stop collar 76 fixed to the upper extremity of the rod 75 by means of a set screw 77. A convexly curved stop collar 78 is slidably mounted on the rod 75 to receive a compression spring 79 thereagainst. The compression spring 79 envelops the rod 75 for substantially the entire length thereof with the lower end abutting against a washer 80 fixed to the rod 75 proximate to the lower end thereof.

The lower end of the rod 75 terminates in a boss 81 that receives a screw 82 therethrough for mounting in the projecting lip 83 of a crank 84. The crank 84 with its lip or arm 82 is mounted on a stub shaft 85 that is journalled in a bearing 86 carried by a lever arm 87 that terminates in furcated spaced ears 88 to receive a bracket 89 therebetween for pivotal mounting of the lever arm 87 by means of a pintle 90. The pintle 90 extends through the furcated ears 88 of the lever arm 87 for support in the bracket 89 that extends upwardly to terminate in a vertical plate 91 for attachment to the housing frame extension 72 by means of screws 92. A pair of curved flat springs 93—94 are attached to the mounting bracket 87 as at 95 to extend around the lever arm 87 and engage therebeneath as at 96 to normally urge the lever arm 87 in a counterclockwise direction (viewed from Figure 2) limited by the lever arm forward extension 97 projecting a rectangular vertical opening 98 provided in the correspondingly shaped stop frame 99 that is formed integral with a vertically extending threaded shank 100.

The threaded shank 100 projects through a vertically bored bearing bracket 101 that is attached to the housing 16 (Figures 1 and 2). Lock nuts 102—103 engage the limiting frame shank 100 on both sides of the vertical bearing bracket 101 to enable the vertical and positioning adjustment of the stop frame 99.

It should be noted that the stub shaft 85 carries a sub-assembly shown in perspective in Figures 6 and 7 comprising a rotary movement limit plate 104 having ears 105—106 disposed in the path of a trip 107. The trip 107 has a horizontal shank 108 provided with a boss 109 intermediate the ends thereof for pivotal mounting on a pin 110. The pin 110 is carried by spaced plates 111—112 fixed to the lever arm bearing 86. The trip 107 is pivotally disposed in the path of the slot 113 for registry therewith as the lever arm 87 is elevated to its extreme upward position in a counterclockwise direction (viewed from Figure 4) at which time the trip shank 108 abuts against a horizontal stop arm 114 that comprises a part of a plate 115 fixed to the edge of the stop frame 99 by means of fasteners 116. A concavo-convexo scooping spoon 117 is oscillatably mounted through its arm 118 and its terminal boss 119 (Figures 6 and 7) to the other extremity of the stub shaft 85 for oscillation therewith in the path of the levelling bowl 32 to scoop predetermined increments of powder therefrom when oscillated in a counterclockwise direction (viewed from Figures 2 and 10) for discharge into the intake 120 of a distribution housing 121 (Figures 8 to 10) as will appear more fully hereinafter.



To this end, the scooping spoon 117 is normally urged to its extreme clockwise position (viewed from Figure 2) by means of a flat spiral spring 122 which has one extremity 123 anchored to the spoon shank 118 and the other extremity 124 fixed to the lever arm bearing boss 86.

In order to avoid the reverse clockwise movement of the scooping spoon 117 (viewed from Figures 2 and 4) from interfering with the level of the powder in the bowl 32, it is held against return movement by the registry of the trip 107 in the slot 113 provided in the oscillation limit plate 104. This holds the scooping spoon 117 in its uppermost position at the end of its operative stroke until the lever arm 87 elevates to its extreme position, whereupon the trip shank 108 will abut against the fixed stop 114 (Figures 6 and 7) and displace the trip 107 from the slot 113, thereby permitting the scooping spoon 117 to return to its initial position responsive to the urge of the spiral spring 122 in operative association therewith. The exact increment of powder can be controlled with great accuracy by raising or lowering the stop frame 99 whose position is accurately controlled by the lock nuts 102—103 in threaded engagement with the threaded frame shank 100 on both sides of the housing frame boss 101. This will enable more or less powder in each increment to be scooped from the bowl 32 that constantly rotates relative to confronting scrapers 125—126 (Figure 3) fitted for contact with the top peripheral end surface of the bowl 32 and to its lower exterior surface, respectively.

An expansion spring 127 is disposed between pins 128—129 extending from the scraper plates 125—126 (Figure 2) to normally urge the scrapers 125—126 in contact with the top peripheral edge and the lower exterior surface of the bowl 32 to maintain the interior level and the exterior clean at all times from the powder that is conveyed through from the supply vessel or hopper 21 in the manner previously described.

The scrapers 125—126 (Figure 3) are pivotally connected together as at 130 and these scrapers 125—126 are shaped as complements of the leveling bowl 32 for frictional association therewith. The complemental scrapers 125—126 have a bracket 131 fixed to the end boss 132 of the lower scraper 126 for attachment by any suitable fasteners 133 to the supply vessel or hopper 21 in a position to effect the support thereof in operative contact with the leveling bowl 32.

It will thus be apparent that with the accurate raising or lowering of the scoop 117 relative to the constant surface level of the powder in the bowl 32, accurate control of the amount of contents that is to be scooped therefrom to consti-

tute an individual charge that is sprayed on a sheet, can be controlled within minute tolerances to provide an effective invisible or impalpable dry film to effectively prevent any possible offset between successive printed sheets delivered by a printing press in stacked relation or in a continuous roll.

It should be noted that the clutch operated cam plate 55 carrying a pin 134 (Figures 2 and 4) in the path of an electro-magnetically operated core 135 comprising a part of a solenoid 136 which serves to stop the operation of the instrumentalities after each revolution for timing the air spray actuating charge in timed relation with the scooping of the powder contents to a position in the air screen, as will appear more fully hereinafter, thereby permitting the cam 55 to slip on the shaft 50 relative to the spring actuated clutch 56—57. Thus the instrumentalities will be held stationary to maintain the scooping spoon 117 momentarily stationary to bring the charge of the scooped powder in a predetermined position for spraying at the time a charge of air is released through the long nozzle 137 provided in the distribution housing 121 to surge therethrough as will appear more fully hereinafter.

The operation of the solenoid 35 is synchronized with the operation of the printing press (not shown) through a switch 138 that has an operating lever 139 that carries a roller 140. The roller 140 is mounted in confronting relation with a cam 141 carried by a shaft 142 that is intergeared to the feeding mechanism of a printing press and is thus rendered operative between the feeding of successive imprinted sheets. The compressed air line leading to the nozzles 27 and 137 (Figures 1 and 8 respectively) communicate with a valve 143 (Figure 5) which, in turn, has an air supply pipe 144 communicating therewith to maintain a constant supply of air under pressure to the valve 143. The valve 143 may also be operated by an arm 145 having a roller 146 in contact with the printing press feeding control cam 141 so that air will be released in proper timed relation through the nozzles 27 and 137 to maintain the leveling bowl 32 over-supplied with dry powder by scraping therefrom and to provide a surge of air for distribution of the predetermined increment of powder to the distribution housing 121.

As shown, the predetermined increment scooped from the bowl 32 is transferred by the scoop 117 to the intake 120 of the distribution housing 121 for downward gravity displacement therein and thereafter circuitously driven through a commingling chamber 147 by the charge of air through the nozzle 137 that enters the conduit 148 interposed between the intake 120 and the commingling chamber 147. A plurality of tubular arms 150—151 have circular chamber complements 152—153 that permit the arms 150—151 to pivot relative to each other and the commingling chamber 147 so that the bell housing 154—155 positioned at their extremities and in communication therewith may be adjustably positioned relative to each other and the imprinted sheets to direct the spray in an expansive film thereon. The air charge through the nozzle 137 is timed with the supply of a powder charge deposited by the scoop 117 in the intake 120 to effect its diffusion and commingling with air at a high velocity around the commingling chamber 147 of the distribution housing 121.

The diffused charge of powder will be blown to the bell housing 154—155 that has downwardly converging peripheral edges 156—157 which merge substantially along a diametric line thereof. The bell housing 154—155 comprise enlarged discharge chambers to effect an expansive spray of powder in a finely divided impalpable film for controlled impingement on predetermined areas in the path thereof substantially over the printed paper as delivered by the printing press and deposited on the printing press bed therebelow (not shown). So that there will be uniform diffusion and distribution, the bell housings 154—155 are internally provided with conically shaped and uniformly spaced concentric distribution rings 158, in this instance five, that are braced by intersecting plates 159 to provide expansive directional paths for the powdered offset charges emanating therefrom.

The electric switch 138 is electrically connected through lead wires 160—161 to the solenoid 136. Another lead wire 162 connects the solenoid 136—136 through the control switch 138 to a suitable source of electrical power 163 (Figure 5), thereby opening and closing the circuit to the solenoid 136 by the timed operation of the printing press cam shaft 142. It will appear, therefore, that the intermittent oscillatable operation of the scooping spoon 117 is accurately timed with the air charge through the control of the air valve 143 that is also responsive to the cam 141. This will insure a constant over-supply of powder to the levelling bowl 32.

It will be apparent from the foregoing that a very simple, dependable, and carefully controlled dry powder or similar substance measuring device has been provided and while illustrated in connection with spraying apparatus for operation in conjunction with a high speed printing press to provide an invisible offset film synchronized with the impressing roller mounting shaft of the printing press, its use has a much wider field of application in packaging and other processing.

While I have illustrated and described a preferred emobident of this invention, it must be understood that the invention is capable of considerable variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

I claim:

1. In a device of the character described, the combination with a compact dust material supply source, of a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, mechanical measuring scooping means in and proximate to said supply source for transferring predetermined increments of solid dust material from said supply source to said predetermined path of air flow, means for releasing predetermined charges of air along said path of air flow in timed relation with the transfer of dust material increments thereto, and an enlarged discharge chamber for controlled and confined expansive effluent distribution of the predetermined increments of dust material in the form of an extremely light dry film.

2. In a device of the character described, the combination with a compact dust material supply source, of means for maintaining a constant supply level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a

predetermined path of flow, means adjustable relative to the dust material supply level for transferring predetermined increments of solid dust material from said supply source to said predetermined path of air flow, and an enlarged discharge chamber for controlled expansive effluent distribution of the predetermined increments of dust material in the form of an impalpable dry film.

3. In a device of the character described, the combination with a compact dust material supply source, of means for maintaining a constant supply of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, adjustable means proximate to said supply source for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, means for releasing predetermined charges of air along said path of air flow in timed relation with the transfer of dust material increments thereto, and enlarged means adjustably positioned externally of said dust material supply source for confining and controlling the expansive effluent distribution of said increments in the form of an impalpable dry film.

4. In a device of the character described, the combination with a dust material supply source, of means including a scraper for maintaining a constant quantity of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, adjustable means for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, and means for controlling the expansive effluent distribution of said increments in the form of an impalpable dry film.

5. In a device of the character described, the combination with a dust material supply source, of means for maintaining a constant level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, scooping means adjustable relative to the dust material supply level for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, and means for controlling the expansive effluent distribution of said increments in the form of an impalpable dry film.

6. In a device of the character described, the combination with a dust material supply source, of means for maintaining a constant level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, conveying means adjustable relative to the dust material supply level for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, means for controlling the expansive effluent distribution of said increments in the form of an impalpable dry film, and means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source.

7. In a device of the character described, the combination with a dust material supply source, of means for maintaining a constant level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, rotary scooping means adjustable relative to the dust material supply level for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, and means for releasing predetermined charges of air along said path of air flow in timed relation with the transfer of dust material increments thereto for expansive distribution in the form of an impalpable dry film.

8. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, scooping means mounted for rotation relative to said levelling container, means for rendering said scooping means adjustable relative to the dust material supply level to transfer increments of dust material therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, and air emitting means in said housing for discharging impulses of air against the increments of dust material to effect the effluent distribution thereof from said housing in a thin expansive impalpable dry film.

9. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, scooping means mounted for rotation relative to said levelling container adjustable relative to the dust material supply level to transfer increments of dust material therefrom, means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source to control the increments of dust material transferred therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, and air control means in said housing for discharging impulses of air against the increments of dust material to effect the effluent distribution thereof from said housing in a thin expansive impalpable dry film.

10. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, conveyor means interposed between said dust material hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means adjustable relative to said levelling container and mounted for rotation relative thereto for transferring increments of dust material therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, and air control means in said housing for discharging impulses of air against the increments of dust material to effect the effluent distribution thereof from said housing in a thin expansive impalpable dry film.

11. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, conveyor means interposed between said dust material hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level

to transfer increments of dust material therefrom, means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source to control the increments of dust material transferred therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, air control means in said housing for discharging impulses of air against the increments of dust material, and means to effect the effluent distribution thereof from said housing in a thin expansive impalpable dry film.

12. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, conveyor means interposed between said dust material hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level to transfer increments of dust material therefrom, means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source to control the increments of dust material transferred therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, air control means in said housing for discharging impulses of air against the increments of dust material, and means to effect the effluent distribution thereof from said housing in a thin expansive impalpable dry film.

13. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level to transfer increments of dust material therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, a distribution discharge chamber communicating with said air chamber, air emitting means in said housing for discharging impulses of air against the increments of dust material, and means to effect the efficient distribution thereof from said housing and through said discharge chamber in a thin expansive impalpable dry film.

14. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level for transferring increments of dust material therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, a distribution discharge chamber communicating with said air chamber, air emitting means in said housing for discharging impulses of air against the increments of dust material, means to effect the effluent distribution thereof from said housing and through said discharge chamber in a thin expansive impalpable dry film, and baffles in said discharge chamber to insure a more uniform expansive spray of the dust material increments.

15. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level for transferring increments of dust material therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, a distribution discharge chamber communicating with said air chamber, air emitting means in said housing for discharging impulses of air against the increments of dust material, and means to effect the effluent distribution thereof from said housing and through said discharge chamber in a thin expansive impalpable dry film.

16. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, conveyor means interposed between said dust material hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means mounted for rotation relative to said levelling container adjustable relative to the dust material supply level for transferring increments of dust material therefrom, means for varying the position of said scooping means relative to said levelling container to control the increments of dust material transferred therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, a distribution discharge chamber communicating with said air chamber, air control means in said housing for discharging impulses of air against the increments of dust material, and means to effect the effluent distribution thereof from said housing and through said discharge chamber in a thin expansive impalpable dry film.

17. In a device of the character described, the combination with a dust material hopper, of a levelling container for receiving dust material from said hopper, conveyor means interposed between said dust material hopper and said levelling container for keeping the latter supplied with dust material, means including a scraper cooperating with said levelling container to maintain a constant quantity of dust material in said levelling container, scooping means mounted for rotation relative to said levelling container and adjustable relative to the dust material supply level for transferring increments of dust material therefrom, means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source to control the increments of dust material transferred therefrom, an air housing in the path of said scooping means for receiving the increments of dust material from said levelling container, a distribution discharge chamber communicating with said air chamber, air control means in said housing for discharging impulses of air against the increments of dust material, means to effect the effluent distribution thereof from said housing and through said discharge chamber in a thin expansive impalpable

dry film, and baffles in said discharge chamber to insure a more uniform expansive spray of the dust material increments.

18. In a device of the character described, the combination with an air housing, of means for supplying premeasured increments of dust material to said air housing, air valved nozzle means in said air housing for producing an expansive dry spray of said dust material increments, and a distributor bell having an outwardly flaring discharge orifice communicating with said housing to receive the dry expansive spray therefrom for controlled discharge over a substantially predetermined area.

19. In a device of the character described, the combination with an air housing, of means for supplying premeasured increments of dust material to said air housing, air-valved nozzle means in said air housing, means for operating said air valved nozzle means in timed relation to said increment supplying means for producing an expansive dry spray of said dust material increments, and a distributor bell having an outwardly flaring discharge orifice communicating with said housing through a tortuous intermediate chamber to receive the dry expansive spray therefrom.

20. In a device of the character described, the combination with a compact dust material supply source, of means for maintaining a constant supply of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, adjustable means for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, means for releasing predetermined charges of air along said path of air flow in timed relation with the transfer of dust material increments thereto, and means for controlling the expansive effluent distribution of said increments in the form of an impalpable dry film.

21. In a device of the character described, the combination with a dust material supply source, of means including a scraper for maintaining a constant quantity of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, adjustable means for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, and means for controling the expansive effluent distribution of said increments in the form of an impalpable dry film.

22. In a device of the character described, the combination with a dust material supply source, of means for maintaining a constant level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, rotary scooping means adjustable relative to the dust material supply level for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, means for controlling the expansive effluent distribution of said increments in the form of an impalpable dry film, and means for varying the relationship of the effective position of said rotary scooping means to the level of the dust material in said supply source.

23. In a device of the character described, the combination with a dust material supply source, of means for maintaining a constant level of dust material in said supply source, a compressed air supply source for directing air under pressure and velocity along a predetermined path of flow, rotary scooping means adjustable relative to the dust material supply level for transferring predetermined increments of dust material from said supply source to said predetermined path of air flow, and means for releasing predetermined charges of air along said path of air flow in timed relation with the transfer of predetermined dust material increments thereto for expansive distribution in the form of an impalpable dry film.

24. In a device of the character described, the combination with an air housing, of means for supplying premeasured increments of dust material to said air housing, air-valved nozzle means in said air housing for producing an expansive dry spray of said dust material increments, and a distributor bell having an outwardly flaring discharge orifice communicating with said air housing to receive the dry expansive spray therefrom for controlled discharge over a substantially predetermined area.

25. In a device of the character described, the combination with an air housing, of means for supplying premeasured increments of dust material to said air housing, air-valved nozzle means in said air housing, means for operating said air-valved nozzle means in timed relation to said increment supplying means, scooping means adjustable relative to the dust material supply level for producing an expansive dry spray of said dust material increments, and a distributor bell having an outwardly flaring discharge orifice communicating with said air housing through a tortuous intermediate chamber to receive the dry expansive spray therefrom.

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