F. E. GOLDSMITH.

COATING MACHINE.

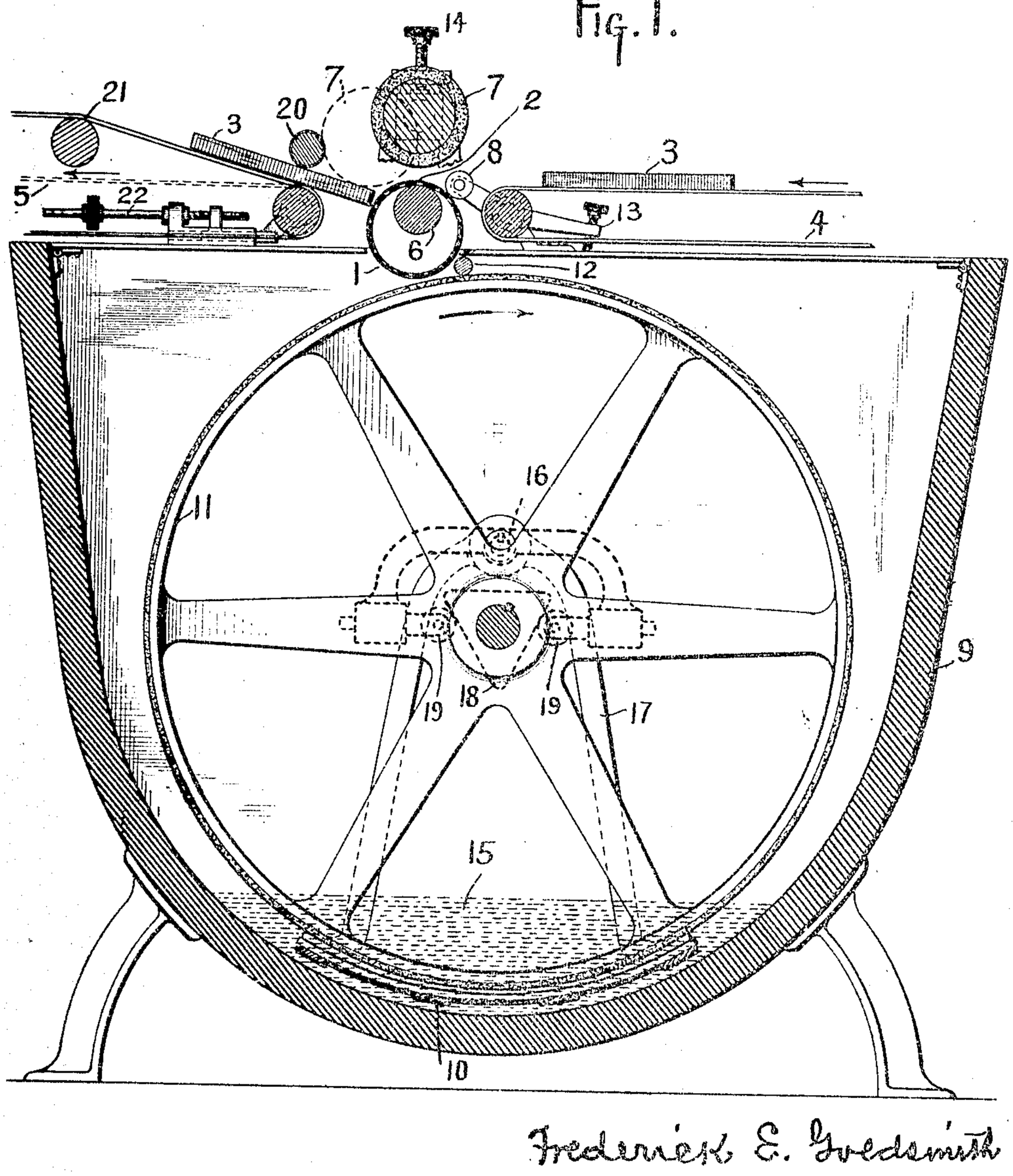
APPLICATION FILED APR. 3, 1905.

926,059.

Patented June 22, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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3 SHEETS—SHEET 2.

2

Fig. 2.

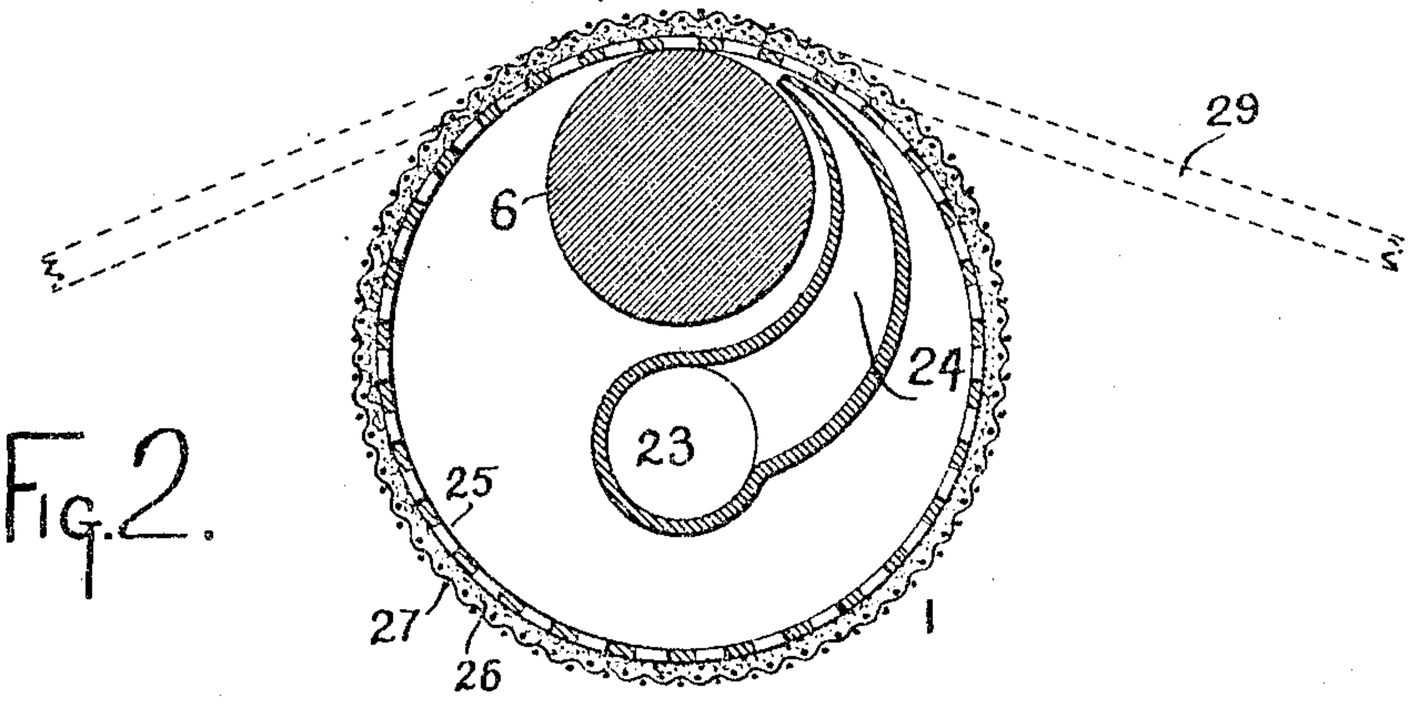
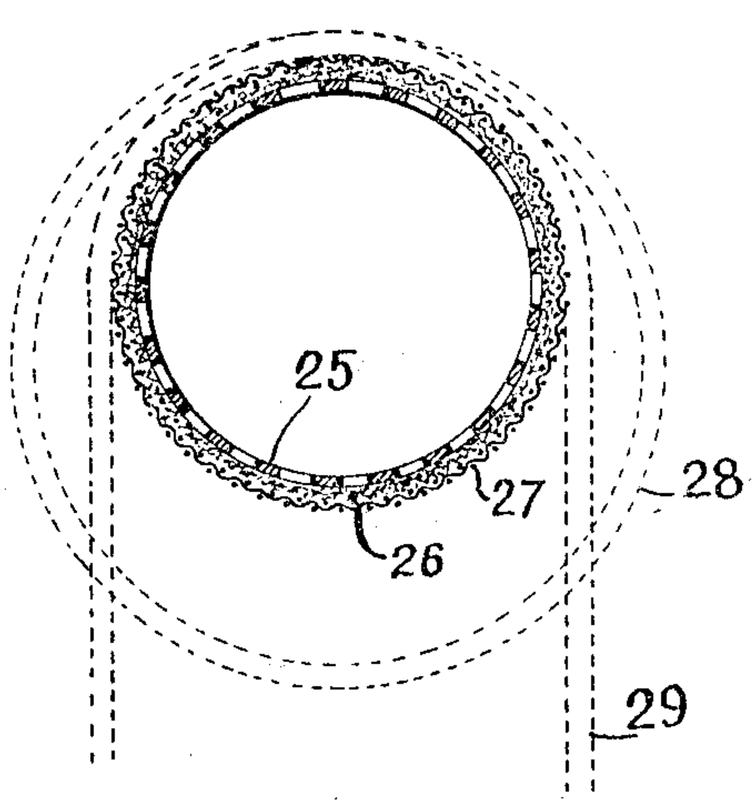


Fig. 3.



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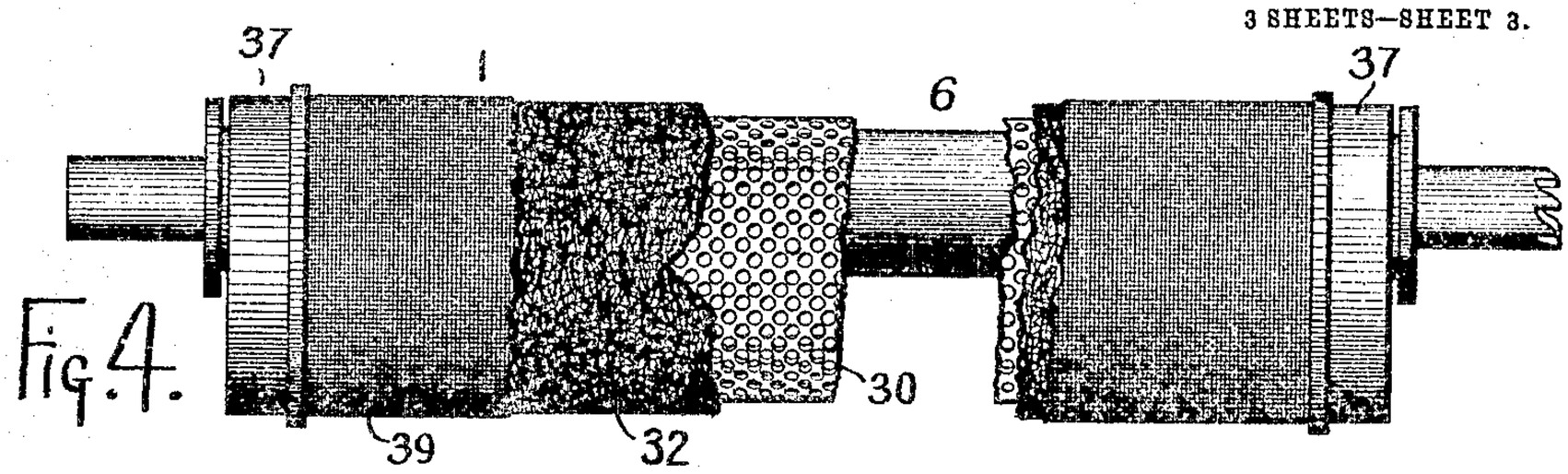

Fig. 4.

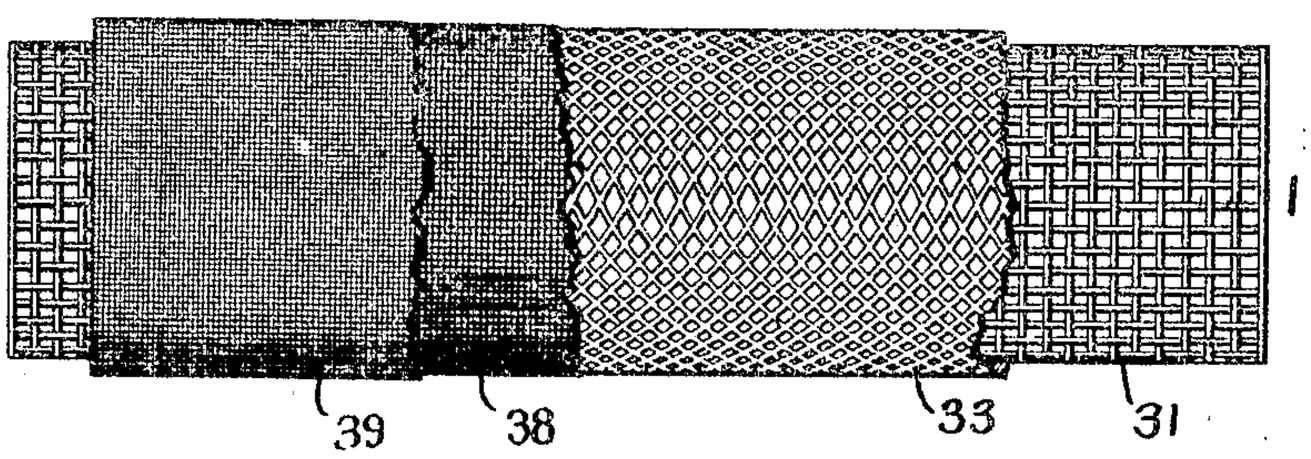

Fig. 5.

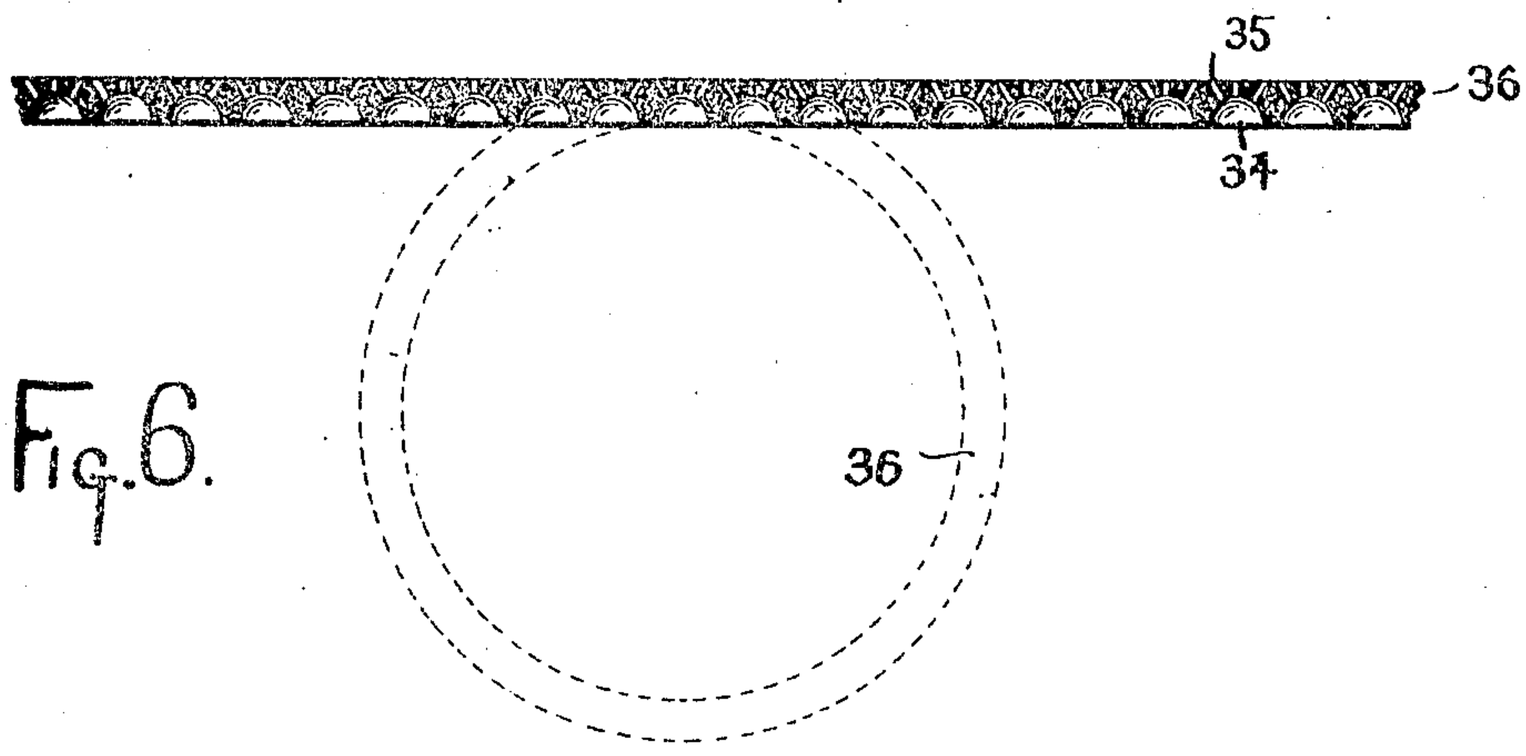

Fig. 6.

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UNITED STATES PATENT OFFICE.

FREDERICK ERNST GOLDSMITH, OF MIDDLETOWN, OHIO, ASSIGNOR TO THE CERAMIC MACHINERY COMPANY, OF HAMILTON, OHIO.

COATING-MACHINE.

No. 926,059. Specification of Letters Patent. Patented June 22, 1909.

Application filed April 3, 1905. Serial No. 253,720.

To all whom it may concern:

Be it known that I, FREDERICK ERNST GOLDSMITH, a citizen of the United States, and a resident of Middletown, in the county of Butler and State of Ohio, have invented certain new and useful Improvements in Coating-Machines, of which the following is a complete specification.

My invention relates to the application of a fluid or plastic coating to the surfaces of objects, such as tile and the like.

The invention consists in the herein described method of applying such fluid or plastic, the details of which will be first fully described, and the characteristic features thereof will be formulated in the claims which follow.

For purposes of definiteness the surface which receives the fluid coating is called the "carrier". That part of the carrier which transfers the coating to the object to be coated is the "impression zone". The fluid or plastic composition to be applied is the "coating". The material, object, tile or the like, to be coated is denominated the "object". The means for bringing the object and carrier together is the "incoming conveyer" while the means for separating them is called the "outgoing conveyer." By "supporting abutment" is meant the support for the carrier in the neighborhood of the impression zone. The coating in the fluid state is supplied to an absorptive, pervious carrier which is saturated therewith. The coating is taken from the carrier by contact of the object therewith. The supply of coating may be aided by some degree of compression causing a flow of coating to the impression zone. This compression may be governed by the object as it receives its coat. The supply of coating may be well controlled by means tending to bring the carrier toward a supporting abutment in advance of the impression zone for the purpose of securing an even and adequate coating upon the surface of the carrier. Means are also employed to withdraw the body of the coating from the surface of the carrier as the object is being, or about to be, separated from the carrier, for the purpose of preventing any undue deposit of coating upon the object at any point, where evenly coated objects of a specified coating are desired.

A characteristic feature of the process may be illustrated by the diagrammatic Figure 1, illustrating in sectional elevation the carrier 1, the impression zone 2, the object to be coated 3, the incoming conveyer 4, the outgoing conveyer 5, the supporting abutment 6, the guiding, feeding, or compression means 7, and the controlling means 8. To the above elements may be added a source of supply 9, for the fluid coating, moving means 10 for agitating the same, transmitting means 11, as a rotary roll, for carrying the coating to the carrier, a dam 12 for forming a pool of coating in proximity to the carrier, adjusting means 13 for varying the controlling means 8, and adjusting means 14 for varying the compression means 7. The carrier is preferably characterized by a sufficient rigidity to enable it to bear uniformly along the length of the supporting abutment 6.

To enable one to easily perceive the broader view of the present invention it is desirable to clearly understand at least one specific manner of carrying out the process, keeping in mind however that this specific description is not commensurate with the generic method, being but a single one of many manifestations thereof. In a tank 9 is placed a quantity of fluid coating 15. A suitably journaled rotary drum 11 is adapted to dip into the coating and carry it on its periphery to the carrier 1. The carrier is adapted to rotate in close proximity to the drum 11, but preferably out of contact therewith. A rotary dam is located upon the drum to the rear of the carrier contact to dam up a pool of coating in contact with the carrier. The rotary carrier 1 is a hollow shell or sleeve of absorptive elastic pervious material, which may be positively driven, or which may partake of the motion of the rotary supporting abutment 6 mounted in suitable bearings. The carrier 1 may be moved or adjusted laterally by bringing one or more rolls 8 to bear thereon, so that a portion of the carrier in advance of the impression zone 2 may be brought against the rotary abutment with sufficient compression to cause a flow of coating to the surface of

the carrier. After the coated object 3 leaves the impression zone 2 the surface flow of coating on the carrier 1 sinks into the body thereof, due to its release from or passage beyond the bearing 8, or to the tendency to create a vacuum between the carrier and the supporting abutment 6 as they separate. The incoming conveyer is an endless belt 4 carried upon rolls. The outgoing conveyer 5 is similar in construction to conveyer 4, but the whole conveyer 5 is adjustable longitudinally whereby its receiving end may be set at varied distances from the carrier 1. This adjustability permits the object coated (depending upon its length) to strike such an angle with respect to the carrier that no excess or ridge of coating is left upon the rear of the object as it leaves the carrier, a condition likely to result unless special provision is made to prevent the same. An elastic guiding or feeding roll 7 is adjustable vertically for different sized objects 3, and may, if desired, effect some degree of compression, as they pass through the impression zone.

Fig. 1 is a cross-section and diagrammatic view of a machine embodying the improved process. Figs. 2 and 3 are similar views of modified forms of the coating means. Fig. 4 is a side view partly broken away of a form of the coating carrier, and Fig. 5 is a similar view of another form thereof with the carrier support removed. Fig. 6 is a cross section of another form of carrier.

An agitator 10 is provided in the tank of coating, below the drum, of any desired construction. It is mounted at 16 on a vibrating frame 17 and may constantly agitate the coating 15 between the underside of the transmitting means 11 and bottom of the supply 9. Yielding means between the positive drive and the agitator, such as a drive cam 18 and spring-supported roll contacts 19 prevent any tendency of the connections breaking if the coating mass at the bottom of the tank should dry or solidify. In the latter case the agitator loosens up the material and itself gradually. 20 is a feed roll assisting in carrying the coated objects away on the conveyer 5. It must not be understood however that these specific features alone may carry out the process. The carrier 1 may be an endless belt, for example, or it may fit the abutment 6 closely. The incoming and outgoing conveyers 4 and 5 may be of any known form. The abutment 6 may be stationary and of various shapes. The contacting means 8 may consist of rolls bearing on the interior surface of the carrier, by means of which the carrier may be brought into contact with the supporting abutment in advance of the impression zone, or other means employed to shift the same. The dam may be a stationary pocket instead of rotary. The coating may be supplied to the carrier by means other than a drum. It may be pumped through a pipe and supplied to the carrier through suitable orifices, or an endless belt may take the place of the drum. Instead of the outgoing conveyer being adjustable to and from the carrier, it may be inclined to the path of travel of the objects coated, and pass over a roll 21. Or the roll 7, hung in bearings oscillating about the impression zone, may swing to the position shown in dotted lines and carry the coated object 3 into substantially the position shown.

Where the outgoing conveyer is adjustable to and from the coating carrier the loose character of the coating surface is not essential, nor where the conveyer is inclined. In fact several independent means of effecting the control of the uniform application of the coating to the object as the latter leaves the carrier are contemplated; as, for example, (1) adjusting the foraminous surface upon the support; (2) inclining the outgoing conveyer to the line of travel of the object coated; (3) adjusting the outgoing conveyer bodily to and from the carrier to vary the distance between them; and (4) oscillating the compression roll above the surface of the coating carrier.

22 are means for adjusting conveyer 5. Instead of the feed-drum the source of coating supply may be a pipe leading the coating solution to and upon the carrier, or under the carrier, and against it preferably in the neighborhood of the impression zone, so that the coating will be carried forward thereto. A feature of this inner or under supply to the carrier serves to effect both the screening and the supply of the coating to the carrier. By this latter plan ill-digested coating which ordinarily would be carried up on the outside method of supply and deposited upon the surface of the object coated, is prevented entirely by this inner method of screening supply.

Other coating-supply means are shown in Figs. 2 and 3. In Fig. 2 the coating is pumped through a tube 23 having lips 24, between which the coating is caused to flow (by a pump, fountain, or the like) to the carrier and carrier support. In Fig. 3 the carrier or carrier-support itself is made a conductor of the coating. The coating flows out through the perforated shell 25 to the carrier, which may be composed of elastic cellular material 26 thereon, and an outer foraminous sleeve 27. But the particular construction of the carrier may be varied within wide limits. In an exterior supply system the carrier may be imperforate and rigid, pervious or elastic. In an interior supply system the carrier is preferably perforate, and rigid or elastic.

In any of the forms in Figs. 1, 2 and 3 the carrier may assume the form of a sleeve 1, or a plurality of sleeves, (1 and 28 Fig. 3)

or a belt, (29 Figs. 2 and 3) or a sleeve and belt (1 and 29 Figs. 2 and 3).

In the shell or sleeve form of carrier, the inner surface may be perforated metal 30 (Fig. 4) or woven metal 31 (Fig. 5). The surrounding layer may be elastic fiber 32 or elastic composition 33, such as rubber. Good results are secured by cross-ribbing the fabric 33; those in the form 33 shown (inclined) giving better results than where the ribs are axially and diametrically disposed. Excellent results are also obtained by making a composition fabric 36 (Fig. 6) with a series of cells or pockets 34 freely open on the inner side 36 and having a series of relatively smaller perforations 35. As this style of carrier, whether of the belt or sleeve form is brought in contact with the carrier-support, a graduated supply of coating is pumped out of it, by regulated compression, sufficient to evenly coat the object. In the sleeve form I may employ flanged collars 37 on either end of the sleeve against which may bear the rolls 8. The flanges prevent the lateral spread of the coating and the collars serve to transmit the rolling adjustment of the sleeve.

Other means of effecting the adjustment of the carrier with respect to its support may be employed. One or more rolls for example may be arranged to bear on the inner periphery of the sleeve 1, or the axis of the sleeve may be made to shift in any way. In fact many known means may be employed for performing all these functions, all of which are contemplated in the improved process. The apparatus may be fed over the objects instead of the objects being fed to the apparatus. The coating carrier its support, the agitator, drum, conveyers, &c. may all be driven from one source of power by any suitable known means.

The coating carrier 1, in the particular form selected for illustration, shows an inner perforated shell, a cellular elastic covering over the shell, and a previous or foraminous exterior layer preferably of metal.

It is a very difficult matter to coat some kinds of articles by machines. Tiles, for instance, have been covered for glazing purposes entirely by hand commercially, owing to the presence of these hitherto insurmountable difficulties. These difficulties occur mainly in connection with white tile, the coating upon which, where a machine is used, having a tendency to form a bead or ridge upon one edge of the tile.

Reference is made to applicant's copending applications Serial Number 210579, filed May 31, 1904, for tile coating machine; Serial Number 223071, filed Sept. 2, 1904, for agitator; Serial Number 257370, filed Apr. 25, 1905, for coating.

I claim as my invention:—

1. In a coating machine, the combination of a coating carrier, means for causing a flow of coating into and through the carrier, means for conveying detached objects to be coated to the carrier, means for carrying the objects away from the carrier, and means for removing the coated detached objects from the carrier without any undue or uneven deposit of coating thereon.

2. In a coating machine, the combination of a coating carrier, means for continuously supplying coating to the impression zone of the carrier, and means for withdrawing a part of the coating into the carrier as the object coated leaves it.

3. In a coating machine, the combination of a coating carrier, means for continuously supplying coating to the impression zone of the carrier, and means for feeding the object to be coated to and removing the same from the carrier, and means for withdrawing the same from the carrier, and means for withdrawing a portion of the coating into the carrier as the coated object leaves it.

4. In a coating machine, the combination of a coating carrier, means for feeding coating into the carrier while the object coated is in contact therewith, and means for causing a portion of the coating to be withdrawn into the carrier as the coated object leaves the same.

5. In a coating machine, the combination of a moving coating carrier, a rotating transfer feeding surface in close proximity to the carrier but out of contact therewith, and means for moving such transfer surface at a speed different from that of the movable coating carrier.

6. In a coating machine, the combination of a coating carrier, means for feeding a supply of coating through the carrier to the impression zone in excess of the normal supply, and means for withdrawing the supply into the carrier as the object coated leaves the impression zone.

7. In a coating machine, the combination of a coating carrier, means for saturating said carrier, and means for withdrawing a portion of the coating into the carrier beyond the impression zone.

8. In a coating machine, the combination of a supply vat exterior to the carrier, a coating carrier, means for continuously supplying coating from the vat to one side of the carrier, means for screening the coating solution through the carrier, and means for coating the object upon the side of the carrier opposite the supply of coating.

9. In a coating machine, the combination of a supply vat exterior to the carrier, a pervious coating carrier, means for continuously supplying coating from the vat to one side of said carrier, and means for coating the object upon the opposite side thereof.

10. In a coating machine, the combination of a supply vat exterior to the carrier, an

elastic pervious coating carrier, means for continuously supplying coating from the vat to one side of the same, and means for coating the object upon the opposite side of the carrier.

11. In a coating machine, the combination of a movable coating carrier, means for supporting the carrier at the impression zone, means for causing a compression of the carrier in advance of said zone, and means for adjustably setting the tension of the compression means.

12. In a coating machine, the combination, of a coating carrier, movable means for supporting the carrier at the impression zone, means for supplying coating to the carrier, and means for simultaneously supplying coating to the moving carrier-support.

13. In a coating machine, the combination of a coating carrier roll, a supporting roll therein, and means for simultaneously supplying coating to the coating roll and to the supporting roll.

14. In a coating machine, the combination of a moving coating carrier, a moving carrier support, means for supplying coating to the carrier at the impression zone, and means for simultaneously supplying coating to the carrier support.

15. In a coating machine, the combination of a coating carrier, means for conveying the coated article away from the carrier, means for compressing the article upon the carrier, and means for angularly adjusting the compression means.

16. In a coating machine, the combination of a coating carrier, means for compressing the coated article upon the carrier, and means for oscillating the compression means about the carrier.

17. In a coating machine, the combination of a carrier, means for conveying the coated article away from the carrier, and means for inclining the face of the conveyer on a line drawn across the face of the carrier.

18. In a coating machine, the combination of a coating carrier, means for supplying coating to the carrier, means for conveying the coated article away from the carrier, and means for adjustably varying the distance between the carrier and the conveyer.

19. In a coating machine, the combination of a pervious elastic coating carrier, an inelastic support for said carrier, means for compressing the carrier in advance of the application of coating, and means for withdrawing the coating into the carrier as the object coated leaves the carrier.

20. In a coating machine, the combination of a pervious elastic carrier, an inelastic support therefor, and angularly adjustable means for compressing the carrier in advance of the application of coating.

21. In a coating machine, the combination of a carrier, a supplementary pervious carrier means for moving a supplementary pervious carrier over the first named carrier, and means for separating said carriers beyond the point where the article is coated.

22. In a coating machine, the combination of a coating carrier, a loose pervious elastic coating carrier thereon, and means for exerting a pressure on said surfaces in advance of coating the article.

23. In a coating machine, the combination of a coating carrier support, a pervious carrier loose thereon, and means for exerting a pressure upon the carrier in advance of the impression zone.

24. In a coating machine, the combination of a pervious coating carrier, a carrier support therefor, said pervious carrier contacting only a part of the carrier support and means for exerting pressure on the carrier in advance of the impression zone.

25. In a coating machine, the combination of a carrier support, an elastic coating carrier having pockets or cells therein, means for segregating the cells, and a pervious outer covering for the same.

26. In a coating machine, the combination of a coating carrier, means for supplying coating to the carrier, means for delivering the coated object and means for tilting the coated object as it passes off the carrier upon the delivery means.

27. In a coating machine, the combination of a coating carrier, means for supplying coating thereto, and carrying-off means constructed and arranged to tilt the coated object as it leaves the carrier.

28. The combination of a coating carrier, means for feeding coating alongside the carrier and means for arresting a portion of the coating adjacent to the carrier.

29. The combination of a coating carrier, means for continuously feeding coating alongside the carrier in excess of the amount required for use and rotary means for arresting a portion of the coating adjacent to the carrier.

30. In a coating machine, the combination of a coating device, means for supplying coating material to the device, means for conveying detached objects to be coated to the device, means for carrying the objects away from the device and means for preventing the deposition of an excess of coating upon the objects.

31. In a coating machine, the combination of a coating device, means for supplying coating material to the device, means for conveying detached objects to be coated to the device, means for carrying the objects away from the device and means acting at substantially the moment of removal of the objects from the coating device for preventing deposition of an excess amount of coating material.

32. In a coating machine the combination

of a coating device, means for supplying coating to the device in excess of the amount required for use and means for withdrawing excess of coating as the object coated leaves the impression zone.

33. In a coating machine, the combination of a coating carrier, means for supplying coating to the carrier in excess of the amount required for deposition and means for withdrawing excess coating into the carrier as the coated object leaves the impression zone.

34. In a coating machine the combination of a coating device, means for supplying liquid coating material thereto, means for conveying objects to be coated past the device and means for inclining the objects to their normal line of travel as they leave the coating device.

35. In a coating machine the combination of a coating device, means for supplying coating to the device, means for conveying coated articles away from the device and means for varying the distance between the device and the conveying means.

36. A coating device for applying liquid coating containing solid matter in suspension, comprising means for screening the coating material prior to its deposition on objects to be coated.

37. A coating carrier constructed and arranged to screen coating material and thereafter apply it to ceramic objects.

38. A coating carrier comprising a plurality of screens constructed and arranged to successively screen coating material passing through the carrier.

39. The combination of a coating device, a coating receptacle, a coating conveyer continuously removing coating material from the receptacle and means for maintaining an auxiliary mass of coating material supplied by the conveyer for immediate use by the coating device.

40. The combination of a pervious shell, a rotary carrier therefor within the shell and means for varying the angular position of the shell.

41. The combination of a rotary spool, a pervious cylinder supported thereby and means for changing the eccentric relation of the shell to the spool.

42. In a coating machine the combination of a core, a coating shell loose thereon a pressure roll and adjustable means independent of the pressure roll engaging said shell to serve in maintaining it in given relationship to the core.

43. In a coating machine, the combination of a core, a coating shell loose thereon, a pressure roll and adjustable means independent of the pressure roll engaging the exterior of said shell to serve in maintaining it in given relationship to the core.

44. In a coating machine, the combination of a rotary core, a coating shell loose thereon, and pressure means engaging the shell near the ends thereof to serve in maintaining a given relationship of the shell to the core.

45. In a coating machine, the combination of a rotary core, a coating shell loose thereon, and means engaging the exterior of the shell near the ends thereof to maintain the shell in given relationship to the core.

46. In a coating machine, the combination of a core, a coating shell loose thereon, and means engaging non-coating portions of such shell to maintain the shell in given relationship to the core.

47. In a coating machine, the combination of a rotary core, a coating shell loose thereon, a pressure roll and adjustable means independent of the pressure roll for maintaining a given relationship between the core and the shell.

48. In a coating machine, the combination of a core, a coating shell loose thereon, and rollers engaging non-coating portions of the shell to maintain the shell in given relationship to the core.

49. In a coating machine, the combination of a core, a coating shell loose thereon, and rollers engaging the exterior of the shell near its ends to maintain the shell in given relationship to the core.

50. In a coating machine, the combination of a core, a coating shell loose thereon, rollers engaging the exterior of the shell near its ends to maintain the shell in given relationship to the core, and means for adjusting said rollers.

51. In a coating machine, the combination of a core, a coating shell loose thereon, a pivoted lever, means carried by said lever for engaging the shell to maintain it in given relationship to the core, and means for angularly adjusting the lever.

52. The combination of a core, a coating shell loose thereon and means for adjusting the angular position of the shell in relation to the core.

53. The combination of a core, a coating shell loose thereon and means exterior of the shell for adjusting the angular position of the shell in relation to the core.

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