F. E. GOLDSMITH.

TILE COATING MACHINERY.

APPLICATION FILED APR. 18, 1904. RENEWED APR. 6, 1909.

944,607. Patented Dec. 28, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

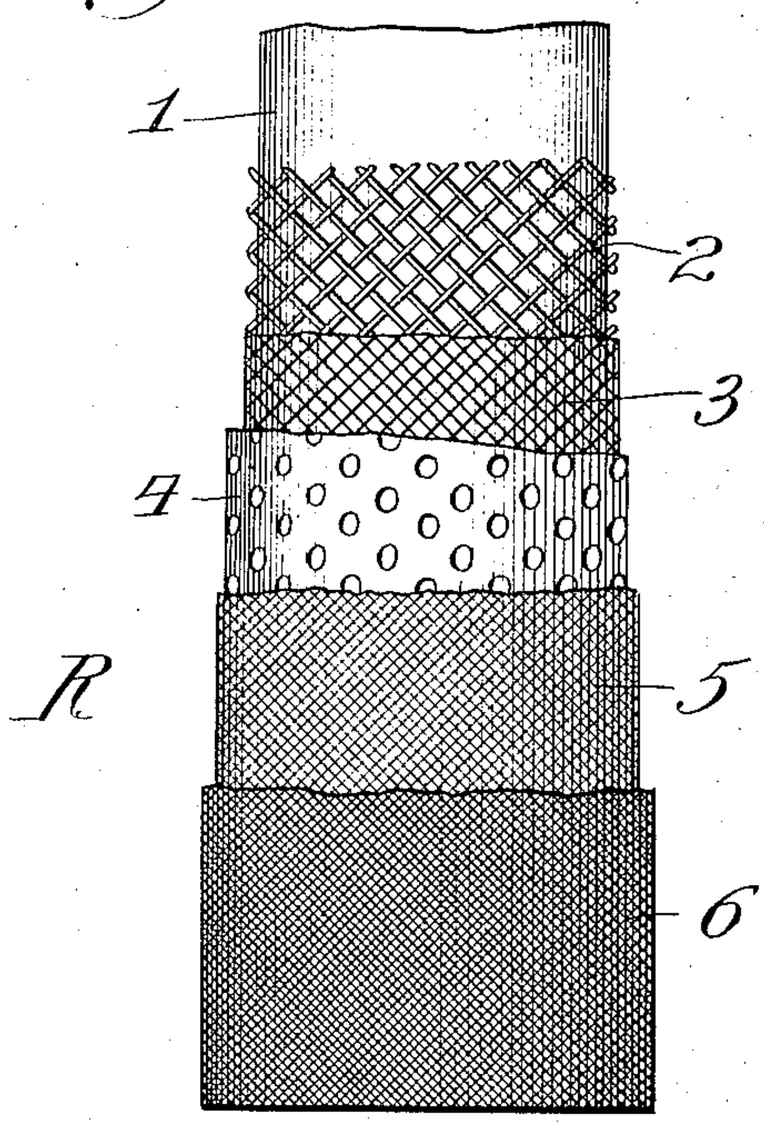


Fig. 3.

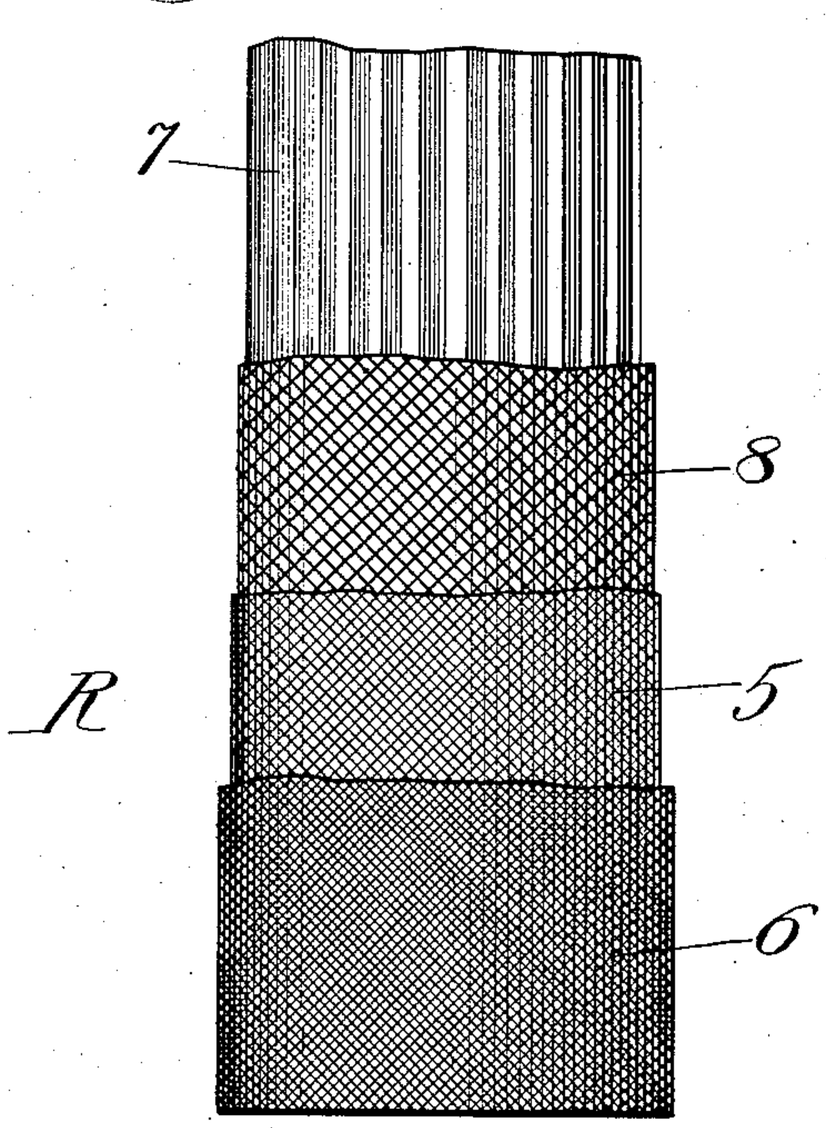


Fig. 2.

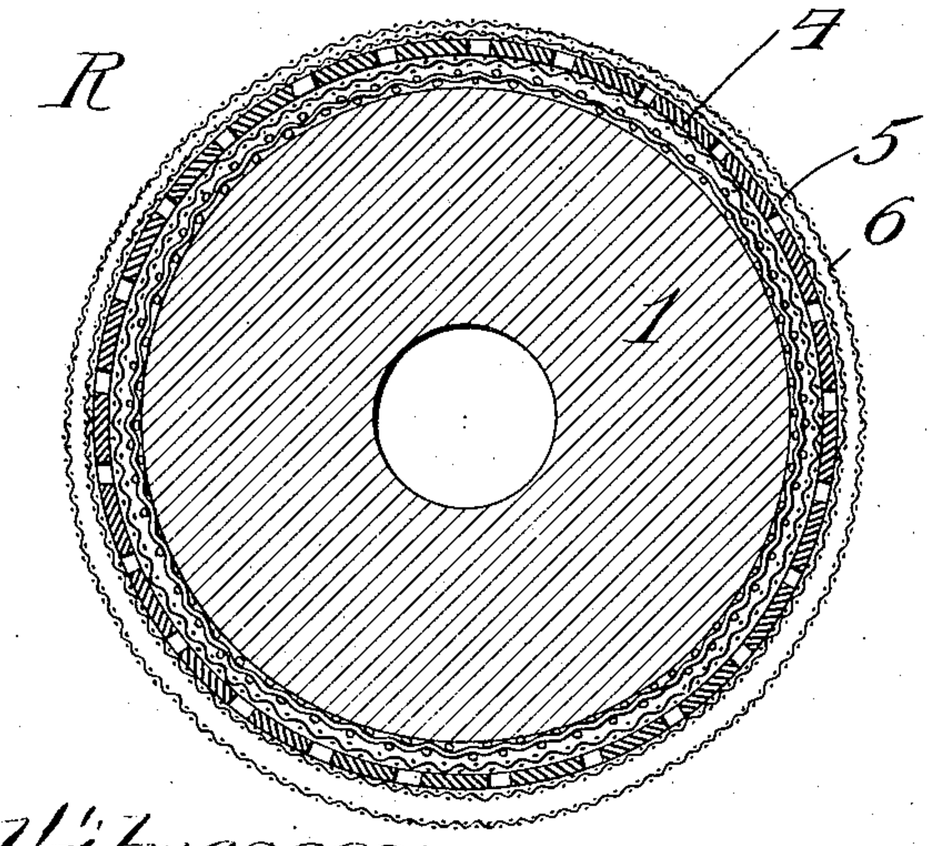
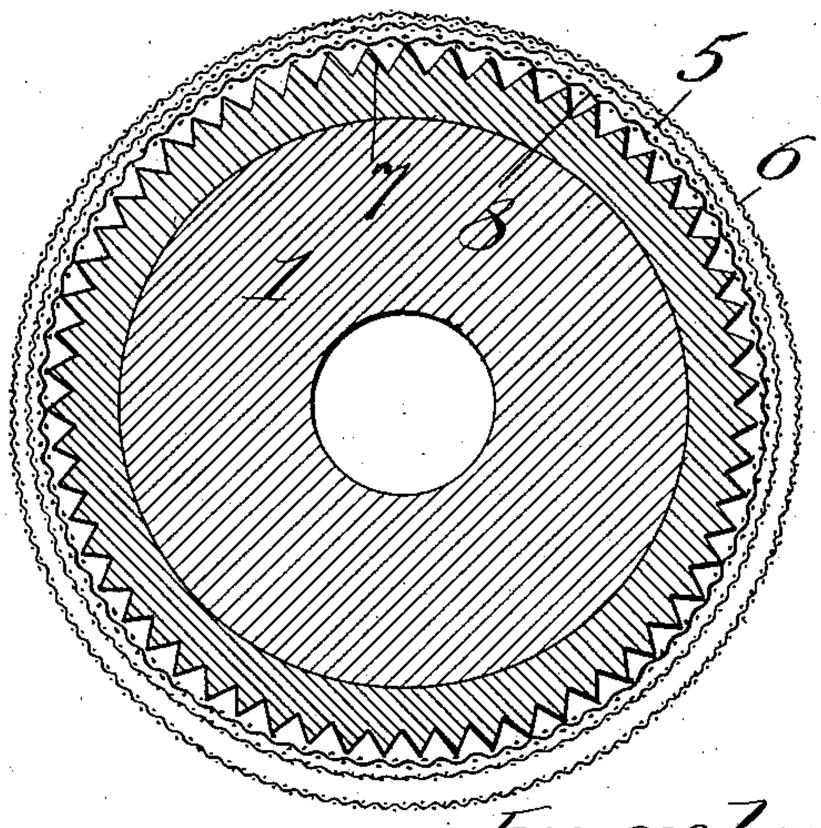


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 5.

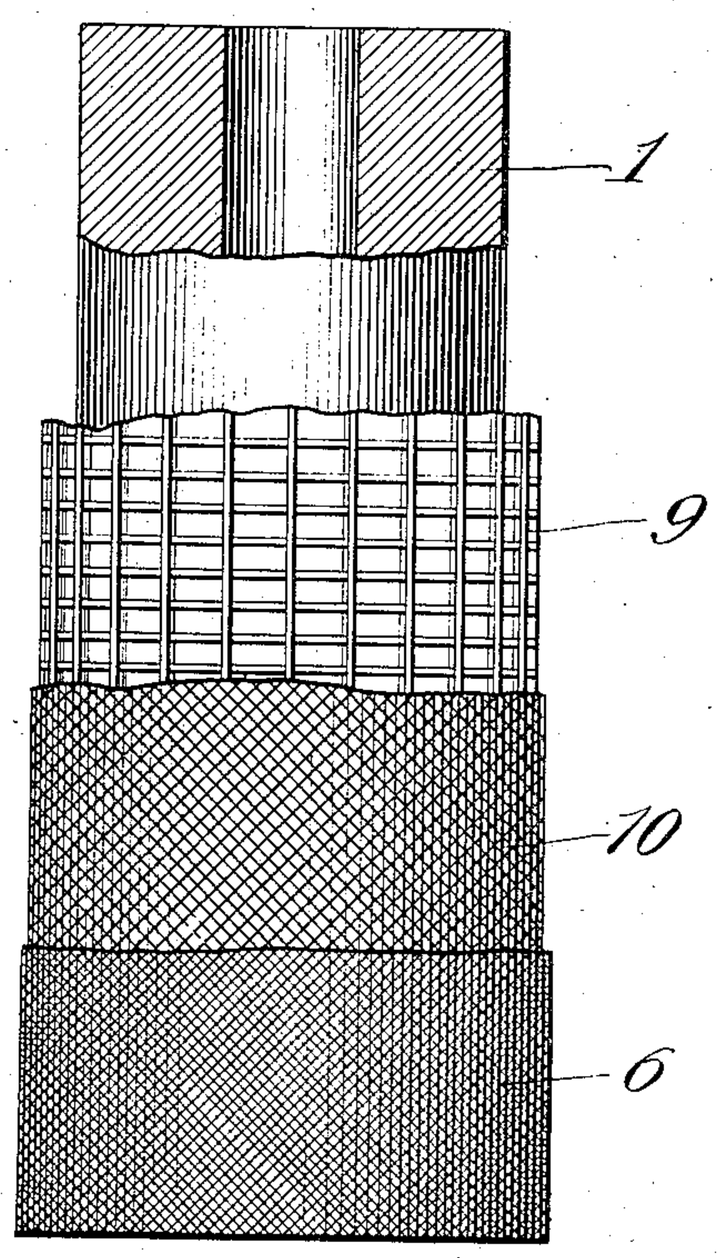
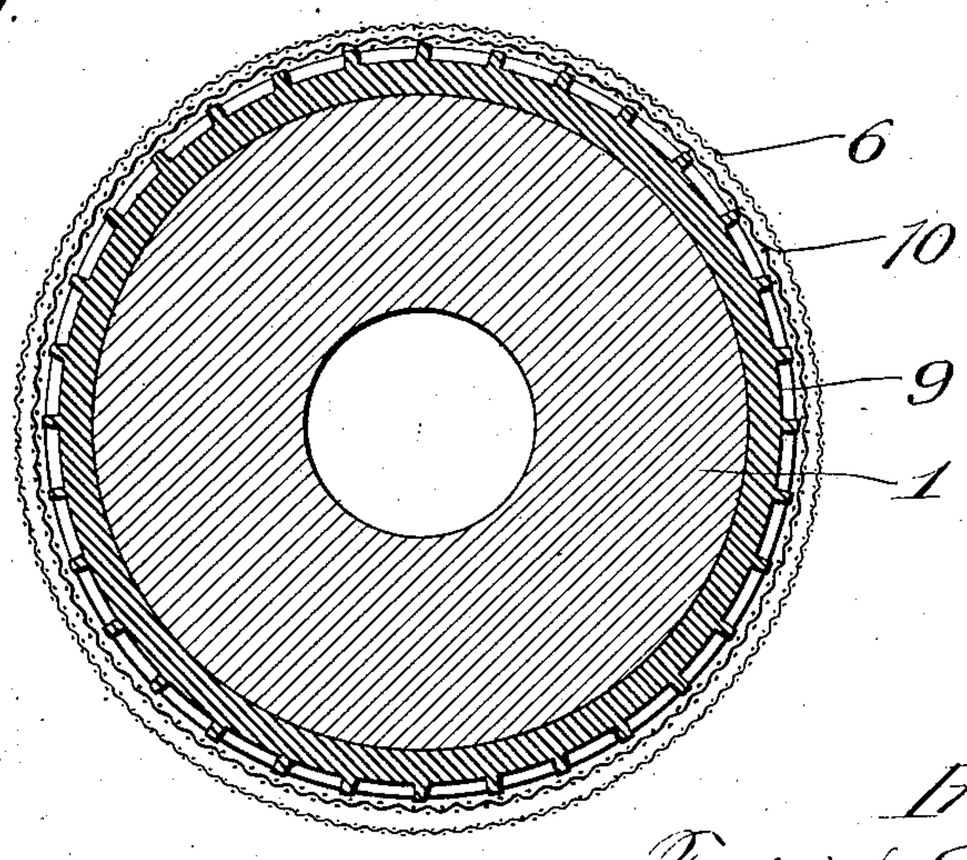


Fig. 6.



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3 SHEETS—SHEET 3.

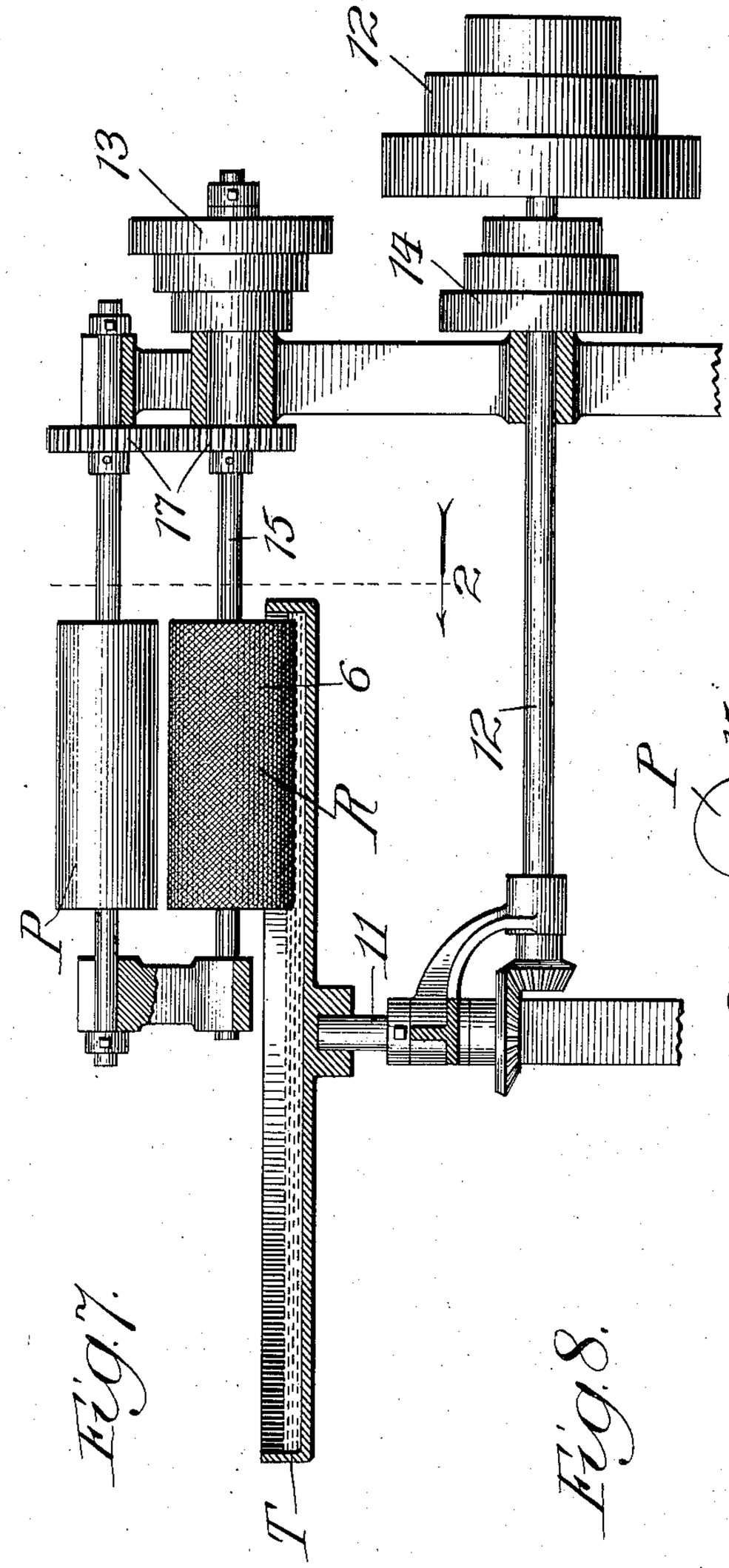

Fig. 7.

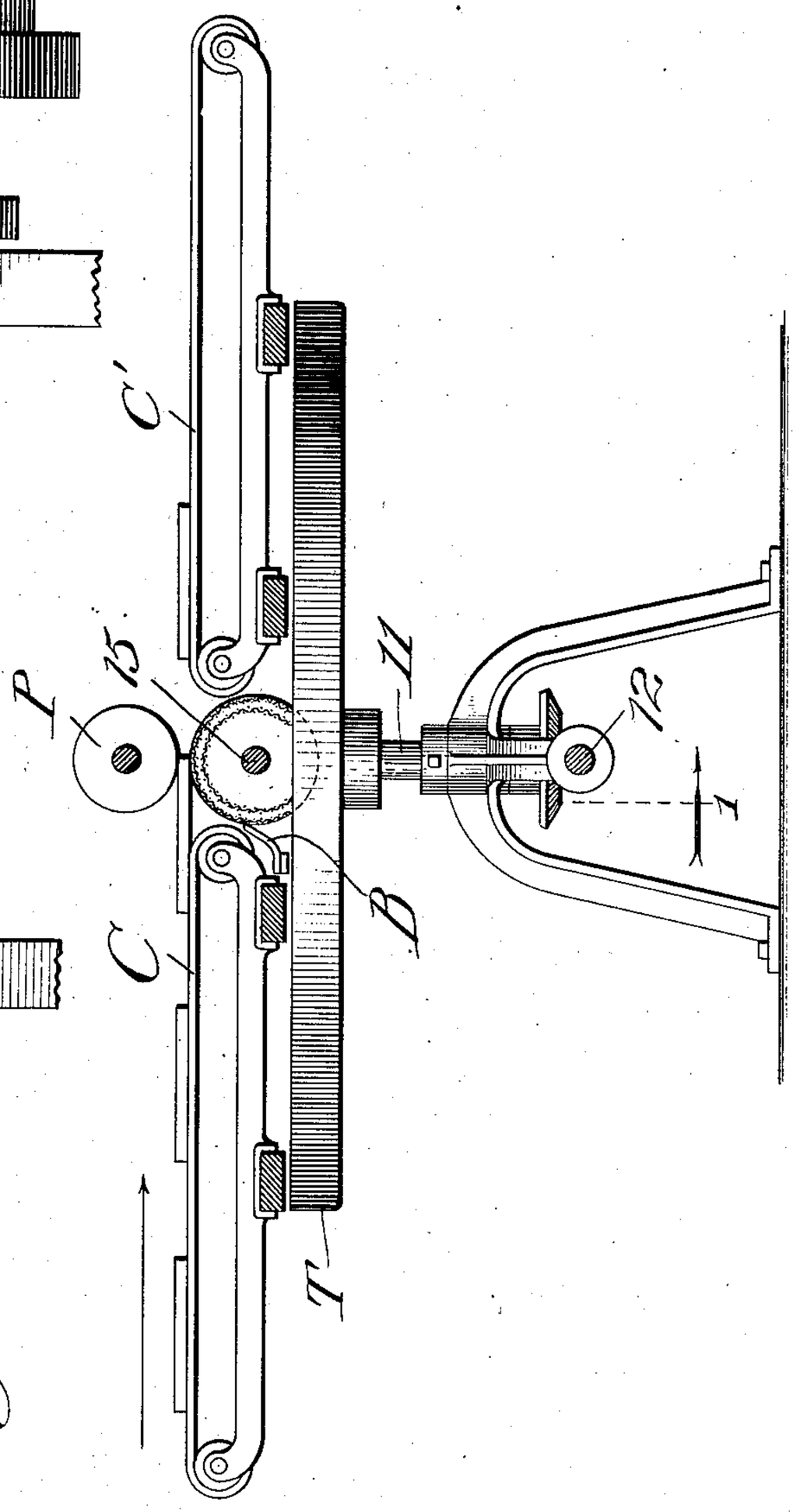

Fig. 8.

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UNITED STATES PATENT OFFICE.

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TILE-COATING MACHINERY.

944,607. Specification of Letters Patent. Patented Dec. 28, 1909.

Application filed April 18, 1904, Serial No. 203,609. Renewed April 6, 1909. Serial No. 488,291.

To all whom it may concern:

Be it known that I, FREDERICK ERNST GOLDSMITH, a citizen of the United States, residing at Hamilton, Butler county, Ohio, have invented certain new and useful Improvements in Tile-Coating Machinery, of which the following is a complete specification.

In the development of tile coating machinery, such, for example, as that shown in my co-pending application, filed May 1, 1903, Serial No. 155,115, the construction or formation of the coating roll has proved to be of the utmost importance in securing a satisfactory working of the apparatus. The tile coating material, usually a lead compound, contains much heavy matter held in suspension, and tends to pile up on a solid surfaced roll in a manner which renders the proper coating of the tile, especially with a white coating, difficult or impossible. The same difficulty also arises where the roll employed is covered with a soft absorbent material, such as felt, and in addition to this, the tile in passing over the roll sinks into the soft or felt surface to such an extent as to become partially coated upon its edges, a result which is particularly undesirable, as it not only involves a waste of material, which is expensive, but entails the useless and costly additional operation of scraping off the edges of the tile. Another serious difficulty arises with either of these forms of rolls, from the fact that they provide no means of getting rid of the air which tends to be carried up with the coating material and to form bubbles on the coated surface of the tile, which bubbles break when the tile is fired and serve to seriously mar the enamel, no matter how minute they may be.

The most satisfactory construction of roll which I have as yet been able to devise is one provided with a hard but flexible and porous surface (such as that afforded by a fine wire gauze or similar foraminous material) mounted upon an elastic cellular or spongy foundation, such surface being flexible enough to yield slightly when the tile passes over it and yet sufficiently stiff and hard to prevent the tile from sinking into the surface. With this construction the coating material, supplied to the roll in any suitable manner, is taken up by the porous foundation and held beneath the surface of the roll until the pressure of the tile causes it to exude through the surface pores in sufficient quantities to coat the face of the tile, but not enough to lap over onto its edges. The cellular nature of the surface foundation thus provided, also enables any air carried up with the coating material to be forced down or squeezed out at the ends of the roll or otherwise prevented from reaching its outer surface and marring the coating operation. A roll of this character may be constructed by covering a cylindric core with several layers of wire screen or gauze, preferably a plurality of separate sleeves of this material telescoped one over the other. In this construction, the inner sleeves will form the compressible cellular foundation for the outside sleeve which affords the actual coating surface of the roll, and the several sleeves will not fit each other so closely but what the air and superfluous color can escape through their interstices and pass out at the end of the roll. A better construction, however, is one in which a cellular foundation for the yielding porous surface of the roll includes a layer of perforated, corrugated or cupped elastic material, such as rubber, over which the gauze sleeves are slipped. Such an elastic layer may consist of a perforated rubber sleeve, in which case one or more inner layers or sleeves of wire screening will be inserted beneath the perforated rubber, or the surface of the core which supports the rubber will be otherwise formed with channels through which any air or coating material forced through the perforations in the sleeve may escape when pressure is applied to the roll. Again, the elastic layer may be the longitudinally corrugated surface of a solid rubber core or of a sleeve fitted over an inner core or cylindric frame work, or, still better, a rubber sleeve or surface ribbed or corrugated in two directions, so as to present a multiplicity of little cups or pockets within which the coating material can lie, may be provided as the foundation for the outer screens or sleeves which, in every case, will be provided in sufficient number to prevent the tile from being marked by the corrugations or ribs of the rubber. As a further improvement, also, and no matter how the yielding porous foundation of the roll may be constructed, it is contemplated that the outermost sleeve or layer which forms the actual coating surface of the roll, will be

fitted loosely over the inner foundation layers so as to be capable of readily slipping thereon, if occasion arises. Without this provision any variation, no matter how slight, between surface speeds of the coating roll and of the tile as it passes over the roll, is accomplished by a slipping of the one relatively to the other, which leaves a mark on the coating applied to the tile. But with the outer sleeve thus loosely surrounding the foundation layers beneath it, the friction between their contacting metallic surfaces is so slight that the outer sleeve adheres to the tile rather than to the roll and assumes velocity exactly equal to the surface speed of the tile, thus preventing the slipping and resultant objectionable markings referred to, and insuring the even coating of the tile's surface.

In order to fully utilize the advantages of the improved construction of coating roll thus referred to, the invention also contemplates the application of a presser bar, preferably a strip or roll of rubber or similar yielding elastic material, to that side of the coating roll from which the tile approaches, at a point above the place where the coating material is supplied to the roll. This bar is designed to exert a continuous pressure on the surface of the roll and compress its cellular structure sufficiently to squeeze down or out at the ends of the roll any surplus of coating material and any air bubbles formed or existing within the coating material taken up by the roll, so that at the top of the roll where it comes in contact with the tile, this coating material will be free from entrained air and only supplied in sufficient quantity to coat the tile uniformly and without lapping over upon its edges.

The object of the invention is to provide an improved construction in devices of the character and along the lines referred to, and it consists of the matters hereinafter set forth and particularly pointed out in the appended claims.

In the accompanying drawings:—Figure 1 is a fragmentary top plan view of a coating roll constructed in accordance with my invention in one form. Fig. 2 is a transverse section thereof. Figs. 3—4 and 5—6 are similar views of constructions of coating roll somewhat modified from that shown in Figs. 1 and 2. Fig. 7 is a fragmentary sectional elevation of a tile coating machine of my invention showing one manner of employing my improved coating roll. Fig. 8 is a side elevation thereof taken at right angles to the view shown in Fig. 5.

As shown in Figs. 1 and 2 of said drawings, the coating roll R is built up about a core 1, which may be of wood, although the construction of that part of the roll is not material. This core 1 is shown as first covered with a cylindric wire screen or sleeve 2, of coarse mesh, and then with a second wire screen 3, of finer mesh, which in turn is inclosed within a perforated sleeve 4 of rubber or the like. This rubber sleeve is then inclosed within a sleeve 5 of fine wire mesh or metallic gauze, and over this again a final sleeve 6 of metallic gauze is slipped to form the actual coating surface of the roll. The several inner sleeves 1—5, in this construction, constitute the cellular foundation for the coating surface of the roll and will ordinarily fit tightly upon each other and upon the core of the roll. The outer sleeve 6 which forms the actual coating surface of the roll, however, is shown as fitting loosely over the foundation layers so that it is free to slip freely upon the inner sleeve 5 if occasion requires. This loose fitting of the outer sleeve is clearly shown in Fig. 2, in a somewhat exaggerated manner for the sake of clearness of illustration, and its object, as hereinbefore stated, is to enable the surface of the roll to take the exact velocity of the tile which is passing over it, notwithstanding the fact that this velocity may be slightly different from that of the roll itself. When the coating roll 4, thus constructed, is mounted in a tile coating machine, it will be supplied with the coating material in any suitable manner, as by itself dipping into a tank or vat, as in the improved machine herein shown in Figs. 7 and 8, or by being rotated in proximity to a drum running in a tank after the manner shown in my concurrent application heretofore referred to. Then as the machine is actuated the coating material will be absorbed through the porous surface of the roll and fill the interstices in its cellular foundation, leaving its outer layer normally clean and practically free from coating material. When, however, a tile is delivered upon a coating roll, as by a carrier apron C, the weight of the tile, assisted, if necessary, by a presser roller P, will cause the cellular foundation of the roll to be compressed and the coating material to exude through the pores of the roll in sufficient quantities to properly coat the surface of the tile. This action of course involves a depressing or yielding of the surface of the roll in the vicinity of the tile, but the stiffness of the metallic gauze comprising the surface is sufficient to distribute the yielding action over a considerable area and prevent any distinct sinking of the tile into the surface, and this fact, together with the fact that the coating material is not squeezed through to any considerable depth, prevents the edges of the tile from becoming coated.

In the somewhat modified construction shown in Figs. 3 and 4, the inner wire screens and perforated rubber sleeve are omitted, and in their place the roll is provided with a corrugated surface 7 of rubber or other flexible elastic material, of which

the grooves or corrugations extend longitudinally of the roll and open out at the ends of the latter. This corrugated surface may be either that of a rubber sleeve secured over an inner core of any suitable construction or material, or may be the corrugated surface of a solid rubber core. In either case it will be surrounded by outer sleeves of wire screen or the like, desirably including a fairly coarse inner sleeve and outer fine wire sleeves 5 and 6, similar to the sleeves 5 and 6 of the construction hereinbefore described in connection with Figs. 1 and 2, and with the outermost sleeve 6 fitting loosely over the foundation sleeves beneath, as before specified. The exact number of screen layers thus provided around the corrugated surface of the roll, may vary from that herein shown, but they must be sufficient to prevent the corrugations of the rubber from leaving their mark upon the tile when coated, and for this purpose the arrangement described has proven satisfactory. A somewhat similar but more approved construction is that shown in Figs. 5 and 6, in which the corrugated surface 9 of the rubber sleeve or solid rubber core is ribbed in two directions, in this instance both annularly and longitudinally, so that the surface consists of a great number of small cups or pockets within which the tile coating material can lodge and be squeezed out as occasion requires. This cup surface is shown as inclosed within a medium coarse inner sleeve 10 and this again by a sleeve 6 of fine wire gauze, as before.

In all of the several roller constructions thus described, the cellular or porous construction of the foundation upon which the coating surface of the roll rests, also enables any surplus coating material or air bubbles carried up into the roll with the film of coating material, or forming therein beneath the surface of the roll, to be squeezed back or out through the ends of the roll, or otherwise eliminated, so that they are not deposited upon the tile. And to insure this elimination of the air, a presser bar B, preferably a strip of rubber or similar yielding flexible material, is applied to that side of the coating roll from which the tile approaches, at a point above the place where the coating material is supplied to the roll (Fig. 8). This presser bar is arranged so as to exert a continuous pressure against the surface of the roll R, and compresses its several layers sufficiently to squeeze down or out at the ends of the roll any surplus material or any air bubbles formed or existing within the coating material occupying the interstices of the several foundation layers of the roll, so that at the top of the roll where it comes in contact with the tile, the coating material is free from entrained air and coats the tile uniformly and without bubbles, or lapping over onto the edges of the tile.

In addition to the function of preventing entrained air forming within the coating, the bar or roll B acts to push the loose, pervious shell away from the core on the side opposite the roll B. The even volume of coating thus caused to flow from the shell during the coating operation is then caused to sink into or be withdrawn into the shell, due to the shell standing away from the core, or to the tendency to create a vacuum between the coated shell and the core.

In the tile coating machine shown in Figs. 5 and 6, the liquid tile coating material is provided within a rotating tank consisting of a shallow circular pan T mounted upon the upper end of a shaft 11 and designed to be kept in continuous rotation by any suitable gearing terminating as herein shown, in a driving cone 12. The coating roll R in this construction dips directly into and nearly to the bottom of the tank or pan T, and is not only supplied with coating material, but serves, in connection with the rotary movement of the tank pan, to keep the coating material in the pan constantly agitated. Driving connection for the roll is here shown in the shape of driving cones 13 and 14, located, one on the driving shaft 15 for the tank pan, and the other on the roller shaft 16. Obviously, however, any other form of connection may be used, if so desired, but some form of change speed drive by which the relative velocities of the tank and coating roll may be regulated, should in all cases be provided.

Endless carriers C and C^1, driven by any suitable gearing not herein shown, serve to feed the tile to and remove them from the coating roll, and the presser bar B, which bears on the coating roll in the manner heretofore described, is located just beneath and in front of the inner end of the feeding in carrier C. The presser roll P is suitably mounted just above the coating roll, and is herein shown as positively driven by gearing 17 from the coating roll shaft 15. The nature of this gearing, however, as well as the manner of mounting the presser roll and other details of the mechanism, may obviously be varied as described.

Reference is hereby made to applicant's co-pending applications Serial Number 253,720, filed April 3, 1905, for coating machine; Serial Number 257,370, filed April 25, 1905, for process of coating; Serial Number 370,655, filed Apr. 27, 1907, for tile coating machine; Serial Number 327,924, filed July 26, 1906, for machines for coating.

I claim as my invention:—

1. The combination of a coating carrier having a pervious surface, a foraminous covering loosely mounted on the carrier, so that the cover and carrier may have relative rotary motion and means for supplying coating material to the carrier.

2. A coating carrier having a pervious surface; and a loosely-inclosing metallic foraminous covering therefor, combined with means for supplying coating to the carrier.

3. A coating carrier having a pervious surface, and a foraminous covering therefor in contact with a portion only of the surface.

4. The combination of a coating carrier, a movable coating surface passing over the same in contact only with a portion of the carrier, and means for exerting a pressure on the carrier in advance of its contact with the article to be coated.

5. The combination of a carrier, a loose pervious surface thereon, and means exerting a pressure on said surface in advance of contact with the article to be coated.

6. The combination of a carrier, a loose pervious elastic surface thereon, and means exerting a pressure on said surface in advance of contact with the article to be coated.

7. The combination of a carrier, a coating surface moving over the carrier, and means for moving the coating surface away from the carrier beyond the point where the article is coated.

8. A coating carrier having a pervious surface and a plurality of loosely enveloping foraminous coverings therefor.

9. A coating roll provided with a cellular rubber periphery inclosed within a foraminous metallic sleeve, substantially as described.

10. A coating roll having a ribbed rubber periphery inclosed within a foraminous metallic sleeve, substantially as described.

11. The combination of a coating roll having a cross-ribbed rubber periphery and a foraminous sleeve loosely mounted upon the roll.

12. A coating roll having an elastic cellular periphery, a foraminous metallic sleeve supported thereby, and a metallic wire sleeve inclosing the roll and forming the actual coating surface thereof, substantially as described.

13. A coating roll having a cellular periphery and an outer foraminous sleeve loosely inclosing the roll, so that the roll and sleeve may have relative rotary motion substantially as described.

14. A coating roll having a cellular periphery inclosed within the foraminous metallic sleeve, and an outer coating sleeve of foraminous metal loosely mounted thereon, substantially as described.

15. A coating roll provided with a cellular periphery, a foraminous sleeve supported thereon, and a second foraminous sleeve loosely inclosing the roll, substantially as described.

16. The combination, with a coating roll having a compressible coating surface, of a compressing member loosely mounted in proximity to the roll to exert a continuous pressure on its coating surface, substantially as described.

17. The combination with a coating roll having an elastic cellular periphery and a foraminous covering therefor, of a presser member exerting a continuous pressure on the roll in advance of its contact with the article to be coated, substantially as described.

18. The combination with a coating roll having a foraminous metallic covering supported on a compressible foundation, of a flexible presser member exerting a yielding pressure on the coating roll, substantially as described.

19. A tile coating machine comprising a coating roll, and a rotary pan for tile coating material into which the roll dips, substantially as described.

20. A tile coating machine provided with a rotary pan for the tile coating material and a roll dipping into the pan and serving both to raise the material for coating the tile and to agitate the material within the pan, substantially as described.

21. A coating carrier having a pervious elastic surface and a relatively firmer covering thereon.

22. The combination of a coating carrier having a loose pervious elastic surface, an inelastic support therefor, and means compressing the surface against the support in advance of the application of coating.

23. In coating apparatus the combination of a coating roll, a pervious covering loosely inclosing the roll, means for driving the roll and means for supplying coating material to the roll and covering.

24. In coating apparatus the combination of a coating roll, a pervious covering loosely inclosing the roll, means for positively driving the coating roll and means for supplying coating material to the roll and covering.

In testimony, that I claim the foregoing as my invention, I affix my signature in presence of two subscribing witnesses, this 14th day of April, A. D. 1904.

FREDERICK ERNST GOLDSMITH.

Witnesses:
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J. P. SCOVILL.