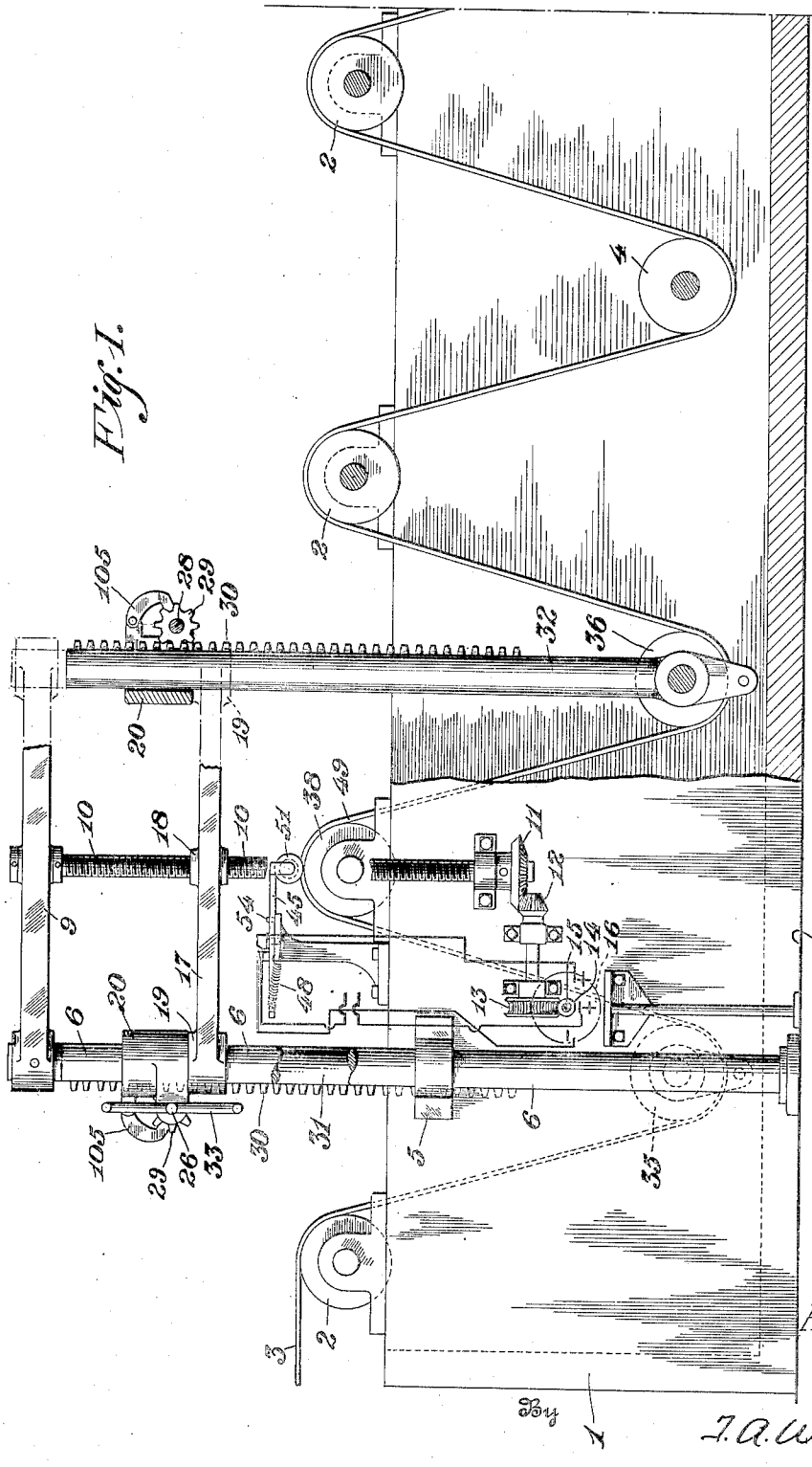
Oct. 19, 1926. 1,603,976

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MACHINE FOR IMPREGNATING ROOFING MATERIAL

Filed Oct. 25, 1922 4 Sheets-Sheet 1

Fig. 1.



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MACHINE FOR IMPREGNATING ROOFING MATERIAL

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Fig. 1a

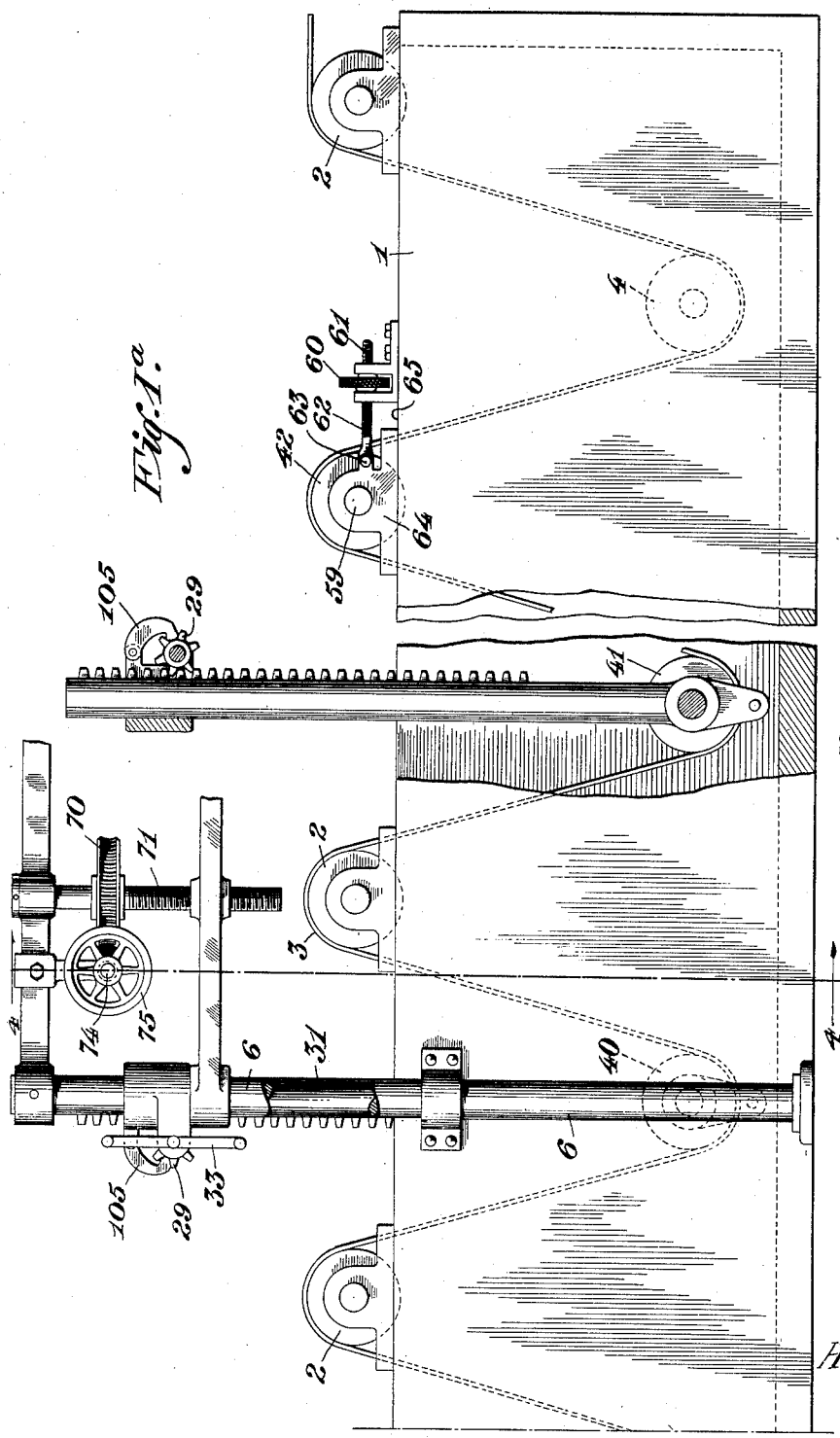
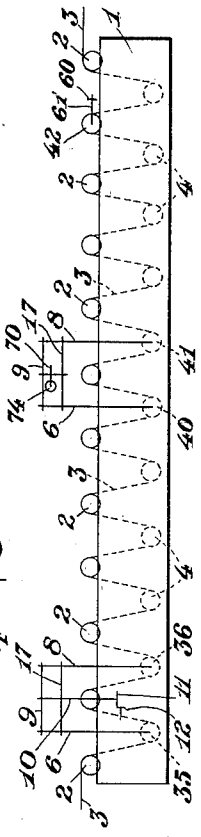


Fig. 1b



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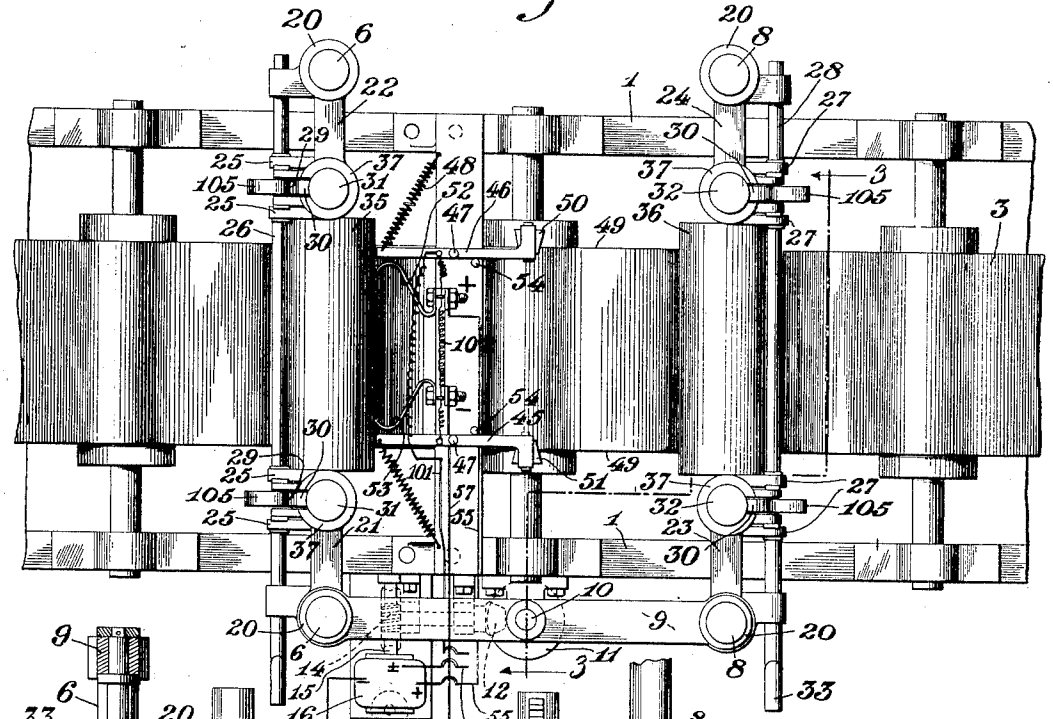
Oct. 19, 1926. 1,603,976

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MACHINE FOR IMPREGNATING ROOFING MATERIAL

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Fig. 2.



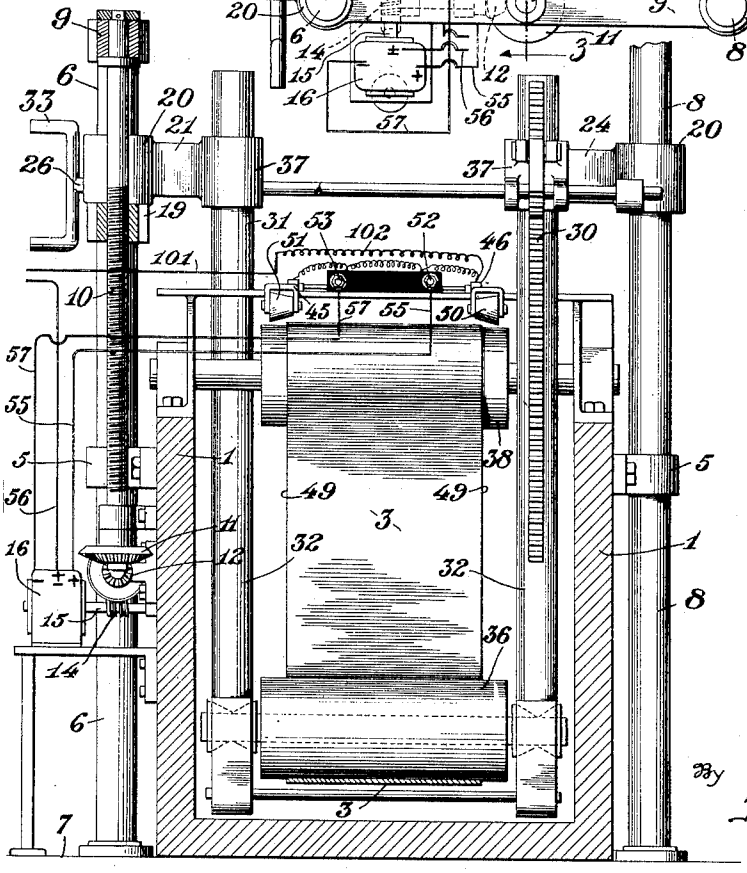


Fig. 3.

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MACHINE FOR IMPREGNATING ROOFING MATERIAL

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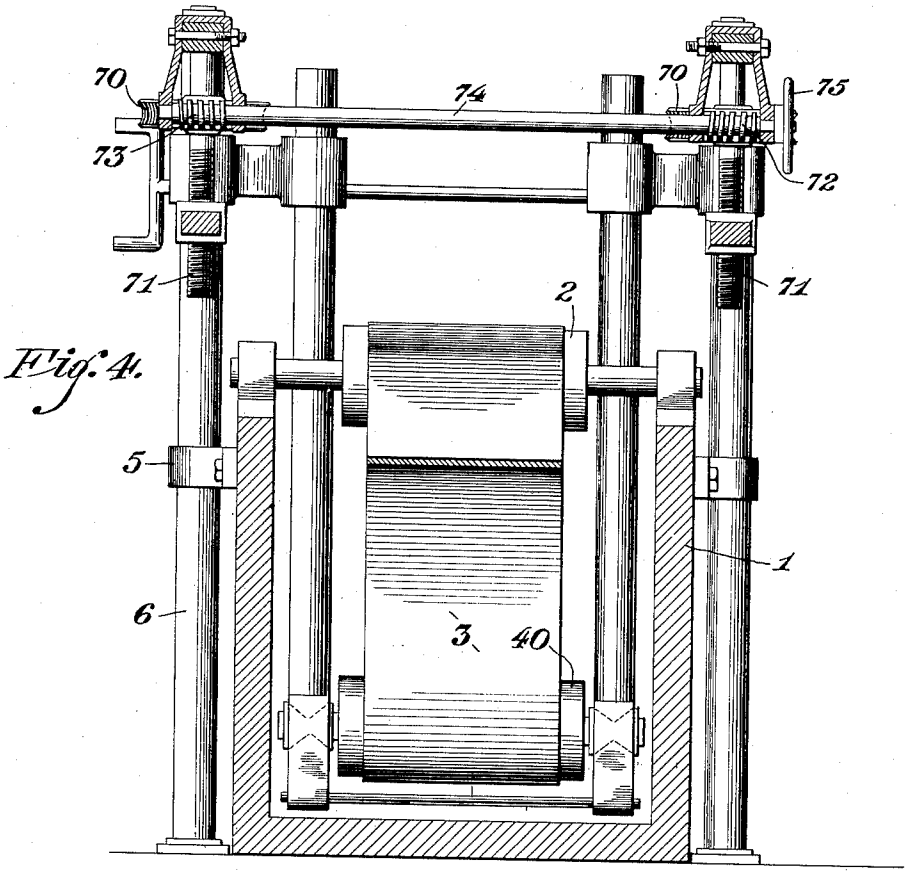


Fig. 4.

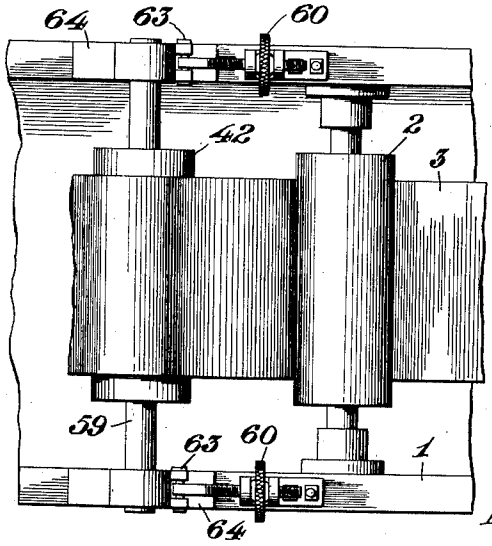


Fig. 5.

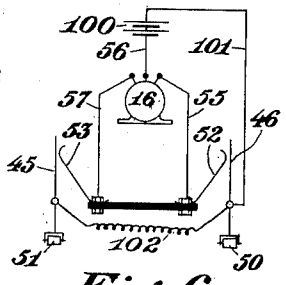


Fig. 6

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UNITED STATES PATENT OFFICE.

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MACHINE FOR IMPREGNATING ROOFING MATERIAL.

Application filed October 25, 1922. Serial No. 596,855.

This invention relates to a machine for coating or impregnating roofing material with asphalt and other substances, and has for its object to provide an apparatus of this character which will be comparatively inexpensive to manufacture, and more certain and efficient in action than those which have been heretofore proposed.

With these and other objects in view, the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views:

Figure 1 is a diagrammatic side elevational view partially broken away of a portion of a machine made in accordance with this invention;

Figure 1ª is a continuation of the view shown in Figure 1, and illustrates the remaining parts of the machine;

Figure 1ᵇ is a diagrammatic view illustrating a tank having eleven submerged rollers or gates;

Figure 2 is a plan view of a portion of the parts shown in Figure 1;

Figure 3 is a sectional view taken on the line 3—3 of Figure 2, looking in the direction of the arrows;

Figure 4 is a sectional view taken on the line 4—4 of Figure 1ª, looking in the direction of the arrows;

Figure 5 is a plan view of a detailed portion of the machine; and

Figure 6 is a diagrammatic illustration of the circuits for the motor 16 and its associated parts.

This invention is an improvement upon that of my prior Patent #1,400,310, dated December 13, 1921, entitled "Coating machine." In order that the precise invention may be the more clearly understood, it is said:

In the manufacture of impregnated roofing materials in which dry felt is passed through a tank containing molten asphalt or other liquid material, it is very desirable that the dry felt shall be thoroughly impregnated in the shortest time possible, for unless the material is thoroughly impregnated, the use of the finished product will be found to be unsatisfactory, and if a sufficient time is taken to thoroughly impregnate the relatively hard dry felt material which is now ordinarily sold on the market, the process is found to be so slow as to make the cost of the finished product much more than is desirable.

Stated in other language, since the World War, rags of a high quality out of which the dry felt is made, are very scarce and therefore they are high in price. It results if rags are to be available at reasonable prices, they are of such quality as to render it harder to thoroughly impregnate the dry felt in a given time than was the case prior to the war. But the ordinary impregnating machines must be run at certain speeds in order to get out a given quantity of the product in a given time. And it is necessary to keep the present relatively nonporous dry felt in contact with the impregnating material for longer periods of time than was heretofore required. Consequently it is found necessary to run the machines made prior to this invention so slow that the output is cut down, and the cost of the product is excessive.

It has been found that the number of rollers or "gates" under which the dry felt is passed when traveling through the impregnating or coating liquid in the prior machines must be limited to five or less, because experience showed that when this number was exceeded, the dry felt sheet would not run straight under and over the guiding rollers or gates, and would break or tear so often that the cost of the product became prohibitive. On the other hand, it was plain that if even six rollers or gates could be employed in an impregnating machine, the tank for holding the liquid could be made longer, and therefore the dry felt could be left in contact with the liquid for a longer time. That is, with the prior speeds, a better impregnation would be had, or if the prior quality of impregnation should be adhered to, a higher speed of travel of the felt and a greater output of product could result.

According to this invention, on the other hand, one is enabled to guide the material under any reasonable number of rollers or gates, without tearing or breaking said material to an excessive degree. That is to say, according to this invention, I provide this machine with as many as six, seven, eight, ten, twelve, or more rollers or gates, as they are called, under which the dry felt travels, and I correspondingly lengthen

the tank or receptacle holding the coating material, and I provide means by which the dry felt is kept in true alinement, and thus I am enabled to keep the dry felt in contact with the coating material a much longer time and to impregnate it much more thoroughly than has been possible heretofore, when it is run at the same speed. Or I am enabled to impregnate the felt to the same degree as has been usual in the prior machines, but at a much higher speed than heretofore, and therefore I am enabled to greatly increase the output of the machine and to correspondingly reduce the cost of the product without impairing its quality.

Referring to the accompanying drawings, 1 indicates any suitable container for the impregnating or coating material, 2 a plurality of stationary rollers over which the dry felt 3 to be impregnated passes, and 4 a plurality of lower stationary rollers under which the said dry felt passes, the latter rollers being immersed in the asphalt or other impregnating material not shown.

Mounted on the tank 1 are a plurality of brackets 5 for holding the vertically disposed outer pairs of standards 6 and 8, resting on the floor 7 or other support of said tank, all as will be clear from Figures 1, 2 and 3 of the drawings. The upper portions of one pair of standards 6 and 8 are joined by a member 9, carrying the screw shaft 10 operated by the beveled gear 11, meshing with the pinion 12, rigid with the worm gear 13, operated by the worm 14 rigid with the shaft 15 of the motor 16, all as will be clear from said Figures 1, 2 and 3. Said shaft 10 passes down through the slidable member 17, provided with the nut 18, which member 17 is provided with the enlargements 19 on which rest the sleeves 20 surrounding the standards 6 and 8. It thus results that as the screw shaft 10 is turned by the motor 16 the slidable member 17 is moved up and down relatively to said standards 6 and 8, and raises and lowers said sleeves 20.

Each standard 6 is provided with a connecting member such as 21 and 22, each slidable on its own standard 6 overlying the top edge of the tank 1, as best shown in Figures 2 and 3. Likewise, each of the standards 8 is provided with a similar member 23 and 24, likewise overlying the top edge of the tank 1, as shown. Said members 21, 22, 23 and 24 are provided with the above mentioned sleeves 20 at their outer ends and with the sleeves 37 at their inner ends as shown. And said sleeves 37 are provided with the pairs of lugs 25 through which pass the resilient or easily bendable rod 26 and with the pairs of lugs 27 through which passes the resilient and easily bendable rod 28. The rods 26 and 28 are provided with the pinions 29 controlled by the detents or dogs 105 as best shown in Figures 1 and 1a. Located in the tank 1 and passing down through the pair of sleeves 37 associated with the members 21 and 22 are a pair of inner standards 31. Also located in the tank and passing down through the pair of sleeves 37 associated with the members 23 and 24 is another pair of inner standards 32. Said inner standards 31 and 32 are each provided with a rack 30 with which a corresponding pinion 29 engages, the sleeves 37 being slotted as shown to permit said racks to project through them. It thus results that upon turning the handles 33 with which the rods 26 and 28 are provided, the pinions 29 will raise and lower the racks 30 and with the latter will correspondingly move the inwardly disposed pairs of standards 31 and 32. During this last mentioned motion, the connections 21 and 22, 23 and 24, will remain stationary and serve as guides for said pairs of inner standards 31 and 32, as will be readily understood. At the lower end of each inner standard of the pair numbered 31 is supported on suitable bearings a lower roll 35, or "gate", as it is termed in this art, and at the lower end of the pair of standards 32 is supported another lower roll or gate 36.

In so far as has now been disclosed it will be clear that the strip 3 of felt to be impregnated will pass over a stationary roll 2, down into the tank 1, under a movable roll or "gate" 35, up out of the tank 1 over a stationary roll 38, down again into the tank 1, under a movable roll or gate 36, up out of the tank over a stationary roll 2, and so on. It will further be seen that should the screw 10 be operated by hand, as in my former patent or by the motor as illustrated in this case, then the member 17 with the sleeves 19 will be raised or lowered. Also, the raising of the sleeves 19 will raise the sleeves 20 associated with an outer standard 6, and an outer standard 8, and will thus raise the outer ends of the connecting members 21 and 23 respectively. Not only will the outer ends of said members 21 and 23 be thus raised, but owing to the resiliency of the rods 26 and 28, the entire members 21 and 23 together with their lugs 25 and 27, near the handle portions of said rods, will also be raised. The raising of these said lugs will cause the pinions 29 near said handle portions 33 to rise, but the pinions 29 near the opposite ends of said rods 26 and 28 will remain stationary. The raising of the pinions 29 will cause the inner standards 31 and 32 near the handles 33 to raise, but the standards 31 and 32, remote from said handle portions, will not rise. The raising of the inner standards 31 and 32 in the manner disclosed will be slight but it will be sufficient to cant or tip the

axes of the rollers or gates 35 and 36 at one end, as will be readily understood.

Of course, the turning of the screw 10 in an opposite direction would serve to lower one end of each of the gates 35 and 36 and thus cant them in an opposite direction. The tipping of the gates 35 and 36 serves when the strip 3 gets out of alinement, to bring it back into alinement and thus prevents breakages, all as is disclosed in my said prior patent.

The foregoing construction is or may be similar to that already disclosed in my said patent, and is found to be satisfactory for a machine equipped with as many as five gates, but when the speed of the strip 3 is greatly increased in order to increase the output of the machine, the construction of my said patent is not found to be as desirable as the construction of this invention for machines having more than five gates, due to the hand operation of my said patented device, and due to the greater difficulty in keeping the strip 3 in alinement throughout a longer path.

Therefore in carrying out this invention, I provide the tank 1 with gates or lower rollers immersed in the tank to a number greater than five.

In fact, in Figure 1[b] I have diagrammatically illustrated a tank having eleven submerged rollers, and it will be evident from what follows that a large number of submerged rollers or gates could be employed if it were desired to equip a tank therewith.

Coming back to Figures 1 and 1[a], of the drawings, it will be observed that in Figure 1 there is an automatic means to be described below for canting the rollers 35 and 36 whenever the strip 3 gets out of alinement, and thus automatically bringing said strip back into alinement. Also it will be seen that in Figure 1[a] there is a hand operated means for canting the gates or rollers 40 and 41 whenever the strip gets out of alinement, and again bringing the strip back into alinement at this mid-portion of the tank. Further, in said Figure 1[a], there is in the right hand portion thereof, which is shown as broken away from the left hand portion, a hand operated means for canting the stationary roller 42 in a horizontal plane, and thus again when the strip gets out of alinement near the end of the tank, of bringing it back into alinement. These various means in an eleven-gate tank are diagrammatically shown as being conveniently spaced apart in Figure 1[b] of the drawings.

It will be clear from what is said below that in operating machines of this character, involving long continuous strips of dry felt 3 which do not have any too much strength and which are submerged in molten pitch or asphaltum, it is a very serious thing for the strips to break, because the molten asphaltum of course is very hot, the operators do not like to handle the broken ends as they are liable to get burned, and furthermore, the pitch or asphaltum sticks or gums up everything in the room, making a very disagreeable situation to clean up. In fact, it is estimated that every break in a strip such as 3 costs the manufacturer something like $50 and when these breaks are constantly occurring, as they do in machines used prior to my invention having as many as five gates or more, his cost is absolutely prohibitive if they are of a certain frequency. The result is, as stated above, that the tanks prior to my invention were limited to five gates at most, and the travel of the strip was furthermore limited to a given speed. But by providing the means in a tank having more than five gates such as is illustrated in Figure 1[a] for canting in a horizontal plane the roller 42 near one end of the tank, it is found that this particular roller need not be disturbed very often in order to keep the strip in alinement. On the other hand, by providing the automatic means such as illustrated in Figure 1 at the other end of the tank, the alinement of the strip practically takes care of itself, even though the speed be high. But whenever there is a tendency for the strip to go wrong, it is a comparatively simple matter to manipulate the means shown at the left hand end of Figure 1[a], and thus is the strip guided in true alinement through an abnormally long tank and at a relatively high speed. The result is a greatly increased output and a less costly product, as will now be disclosed in detail.

Referring again to the automatic strip alining means shown in Figures 1, 2, and 3, 45 and 46 represent a pair of levers pivoted as at 47, and controlled by the springs 48. These said levers carry at one end the cone shaped rollers 50 and 51, adapted to normally be out of contact with the edges 49 of the traveling strip 3, as best shown in Figure 3. On the other hand, due to the conical form of the said rollers should the strip move out of alinement toward the right as seen in Figure 3, it would contact with the roller 50 and thus swing the lever 46 on its pivot 47 and cause circuit to be made with the contact 52. Should the strip 3 move toward the left, as seen in Figure 3, its edge 49 would contact with the roller 51 and thus turn the lever 45 on its pivot 47, and make circuit with the contacts 53. The springs 48 return the rollers 50 and 51 to their normal positions as soon as the edge 49 of the strip gets back into alinement, as will be readily understood. In the meantime, the stops 54 limit the movement of said levers 45 and 46, and thus insure that

the rollers 50 and 51 will always be brought back to their normal positions illustrated in Figure 3.

Supposing the circuit to be made through a movement of the roller 50 and at the contact 52, current will pass from the source of current 100, see Figure 6, along the wire 101 to the lever 46, through said lever to the contact 52, along the wire 55 to the positive side of the motor 16, through said motor, and return through the neutral wire 56 back to its source 100. The rotation of the motor under these conditions will be such as to turn the screw 10 in a proper direction to cant or tip the gates or movable rollers 35 and 36 on their axes, in such a way as to cause the edge 49 of the strip 3 which is in contact with the roller 50 to leave said roller and to get back into alinement over the stationary roller 38 and under the movable rollers 35 and 36. On the other hand, should the opposite edge 49 of the strip 3 contact with the roller 51, current will pass from the source 100, Figure 6, over the wire 101 to the lever 46, from said lever 46 over the wire 102, to the lever 45 to contact 53, over the wire 57 to the other side of the motor, through said motor, and back over the common return wire 56 to the source 100. This said circuit will cause the motor to turn in an opposite direction, and therefore to rotate the screw 10 in an opposite direction, and to tip the gates or rollers 35 and 36 in an opposite direction, with the result that the edge 49 of the strip 3 that is in contact with the roller 51 will be moved away from said roller and back to its normal position. The result is as will be readily understood, that the strip 3 will automatically be kept in alinement not only over the rollers 35 and 36, but over a plurality of rollers that may be located on each side of said rollers 35 and 36. On the other hand, when the speed of the strip 3 is high, the strip is very liable indeed to get out of alinement at or near the right hand end of the tank, as shown in Figure 1a and especially when there are a large number of gates such as are illustrated in Figure 1b. But again, a little experience shows that when the strip is automatically kept in alinement at the left hand end of the tank, as is the case in Figure 1, it is only necessary under ordinary conditions to move the axis of the roller 42 or to cant the same, in a horizontal plane, a certain small distance, to be determined by experience, until the strip begins to run true, when under ordinary conditions, it will continue to run true, requiring a minimum of attention. This moving of the axis 59 of the roller 42 is conveniently accomplished as will be clear from Fig. 1a by turning the knurled disk 60 over the screw threads 61 of the rod 62, pivoted as at 63, to the bracket 64 carrying said axis 59, and which is made slidable on the upper edge 65 of the tank by means not shown. The sliding of one end of the axis 59 in a horizontal plane is only slight in any case, but the knurled disk 60 enables the operator to move the end of said axis over to the right or left, as the case may require.

Since the operator might be on either side of the tank 1 when a moving of the axis 59 of the roller 42 is required, the mechanism illustrated in Figure 1a is duplicated on each edge of the tank, as will be clear from Figure 5, in order to enable the operator at all times, no matter where he may be, to readily manipulate the same.

Especially when there are a relatively large number of gates or submerged rollers in tanks of this character, and the speed is high, for reasons that cannot be foreseen or explained, the strip will often get out of alinement in spite of everything that can be done, and therefore between the alining devices involving the roller 42 at one end of the tank and the rollers 35 and 36 at the other end of the tank, I prefer to locate a hand operated alining device which enables the operator to correct the running of the strip whenever he observes it to show a tendency to get out of alinement. Therefore, in the left hand portion of Figure 1a, I have shown a device which is substantially similar to the alining devices shown in Figure 1, which is hand operated.

That is to say, the parts that are common to Figure 1a are designated by the same numerals and the main difference consists in providing a pair of screws 71 having a pair of worm wheels 70 operated by a pair of worms 72 and 73 carried by the shaft 74 operated by the hand wheel 75, all as will be clear from Figures 1a and 4. It is preferred to make the worms 72 and 73 with oppositely inclined screw threads so that when one screw 71 is being raised the other will be lowered. That is, when one end of the gate or roller 40 is being raised, the other end will be lowered, and thus will an unusually quick correction of the alinement of the strip 3 be had.

It will now be clear that by providing a plurality of strip controlling devices as disclosed, the manufacturer of roofing and other material is enabled to maintain a complete control over the alinement of his traveling felts during the impregnating operation, and he therefore is enabled to use in practice, tanks accommodating more than five submerged guiding rollers or "gates" which could not be so used prior to my invention. In fact, it will be clear that almost any number of submerged guide rollers may be used, and the speeds of the strips greatly increased by this invention, thus keeping strips in contact with the impregnating material for a time sufficient to produce a satisfactory product, while at the same time

greatly increasing the output of the machine. A further advantage of an increased number of gates resides in the fact that as the strips 3 pass over the rollers 2 the pores of their top surfaces are stretched or opened, while the pores of their under surfaces are compressed or closed, and the opposite effect is produced as the strips pass under the submerged rolls 35, 36, 4, etc. It thus results that that as the number of guide rolls increases, the facility with which the liquid impregnates the strips increases, and a better product results even at a higher speed.

It is obvious that those skilled in the art may vary the details of the procedure, as well as the construction and arrangement of parts without departing from the spirit of the invention, and therefore I do not wish to be limited to the foregoing disclosure except as may be required by the claims.

What is claimed is:

1. In a machine for coating flexible material, the combination of a container for the coating composition; more than five guide rolls for said material located outside of said container; more than seven guide rolls for said material immersed in said composition; and hand operated and automatic means comprising a screw member and connections to cant the axes of a plurality of said last named rolls during the coating operation, substantially as described.

2. In a machine for impregnating a flexible material with a molten composition, the combination of a container; more than five guide rolls located outside of said container; more than five guide rolls immersed in said composition; and a plurality of independent means one of which is automatic in action for moving a plurality of said immersed rolls to keep said material in alinement, substantially as described.

3. In a machine for impregnating a flexible material with a molten composition, the combination of a container; more than six guide rolls located outside of said container; more than six guide rolls immersed in said composition; and a plurality of independent means, one of which is automatic in action and one of which is hand operated, for moving a plurality of said immersed rolls to keep said material in alinement, substantially as described.

In testimony whereof I affix my signature.

HENRY M. NICHOLLS.