April 5, 1927. 1,623,612

H. APPLIN

SHINGLE MACHINE

Filed June 16, 1926 6 Sheets-Sheet 1

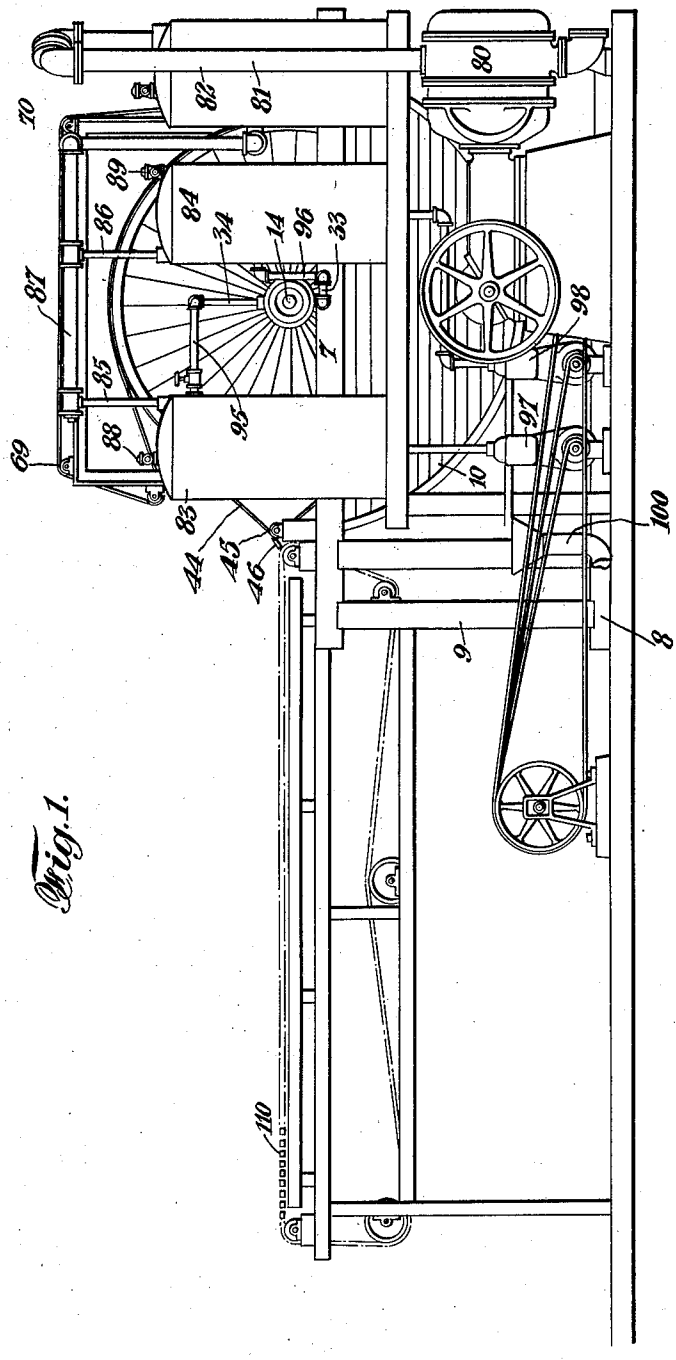


Fig. 1.

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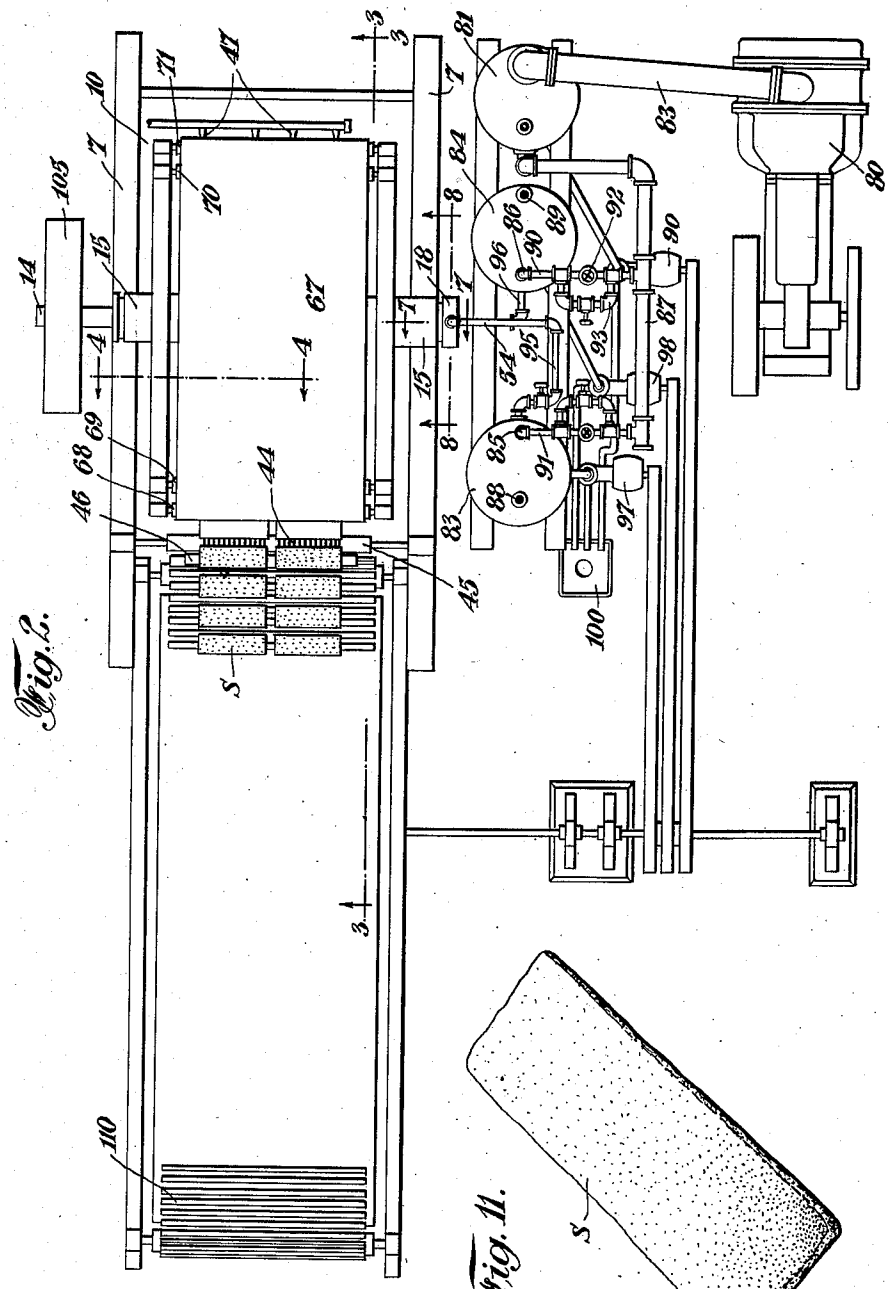


Fig. 2.

Fig. 11.

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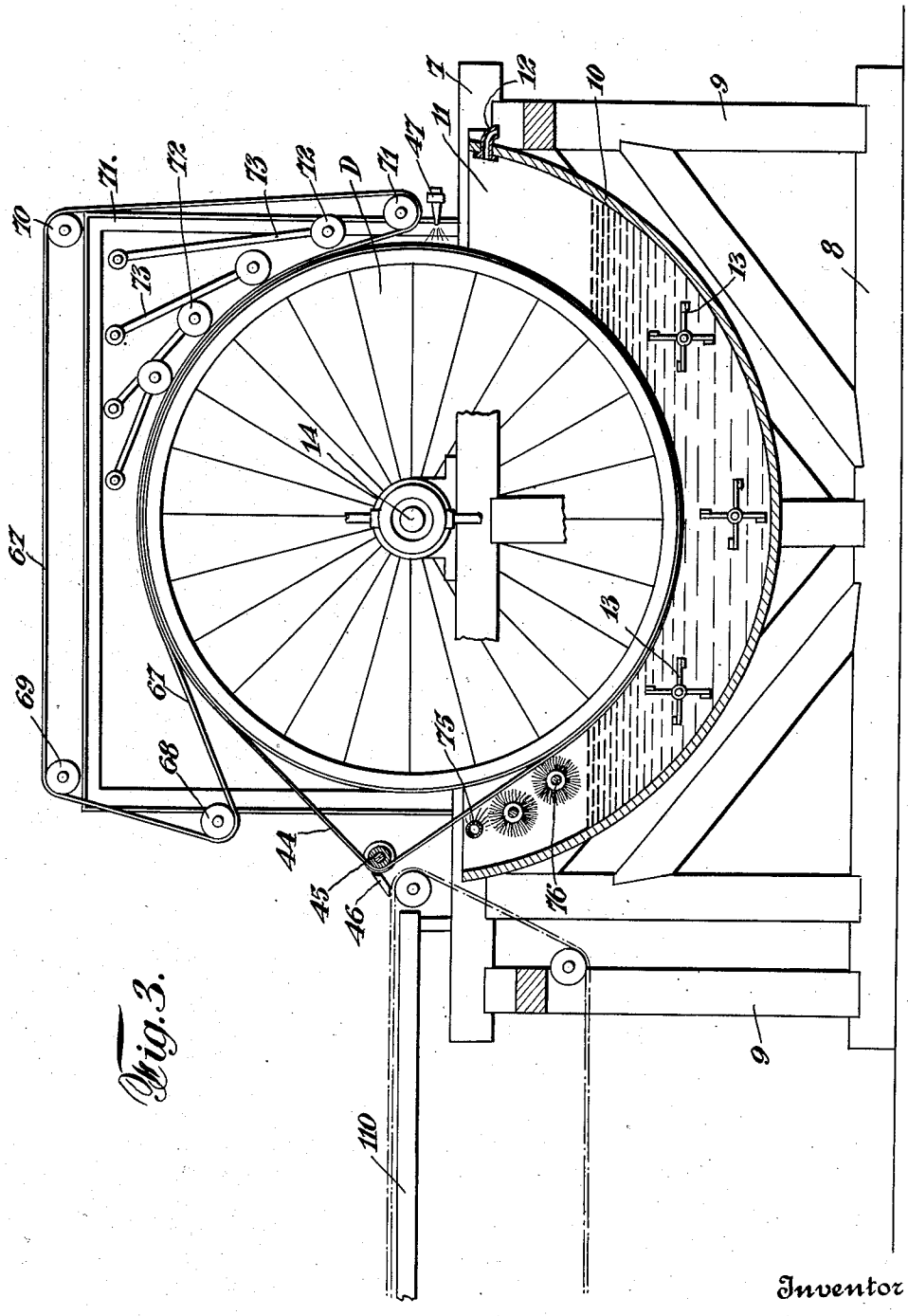


Fig. 3.

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Fig. 4.

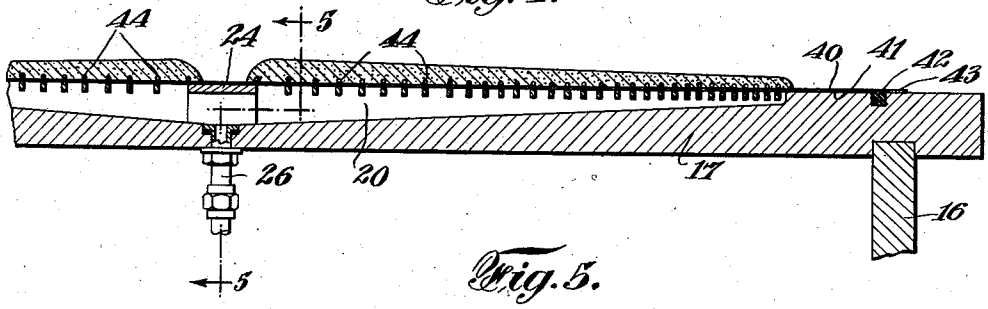


Fig. 5.

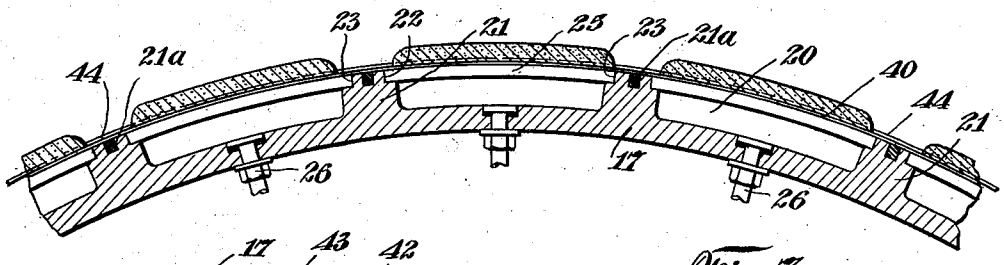


Fig. 6.

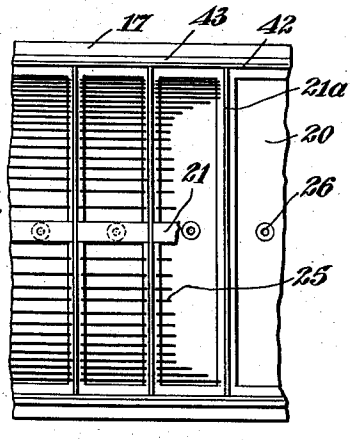


Fig. 7.

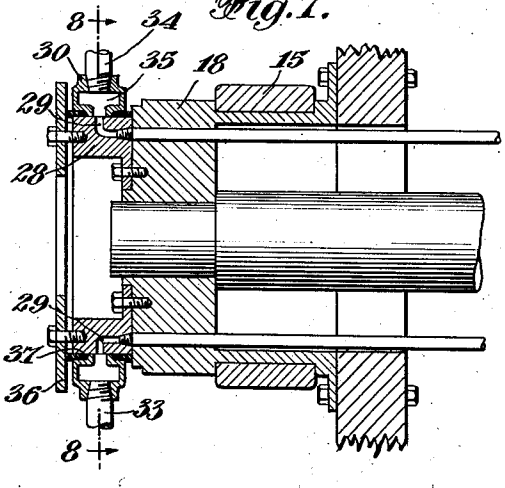
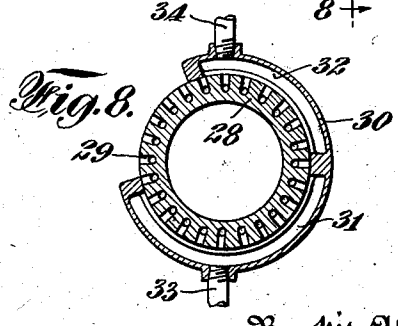


Fig. 8.



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Fig. 10.

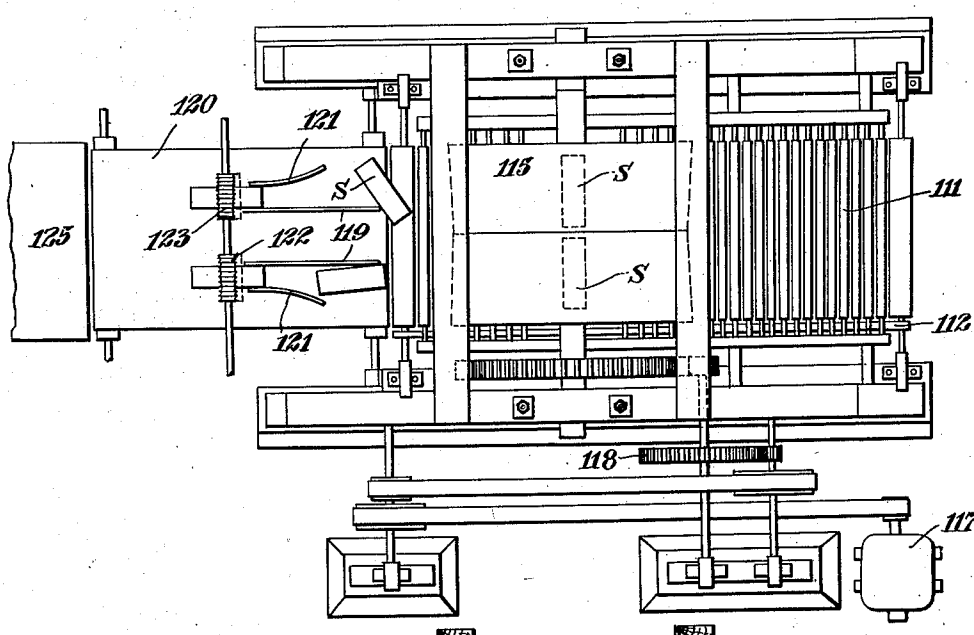
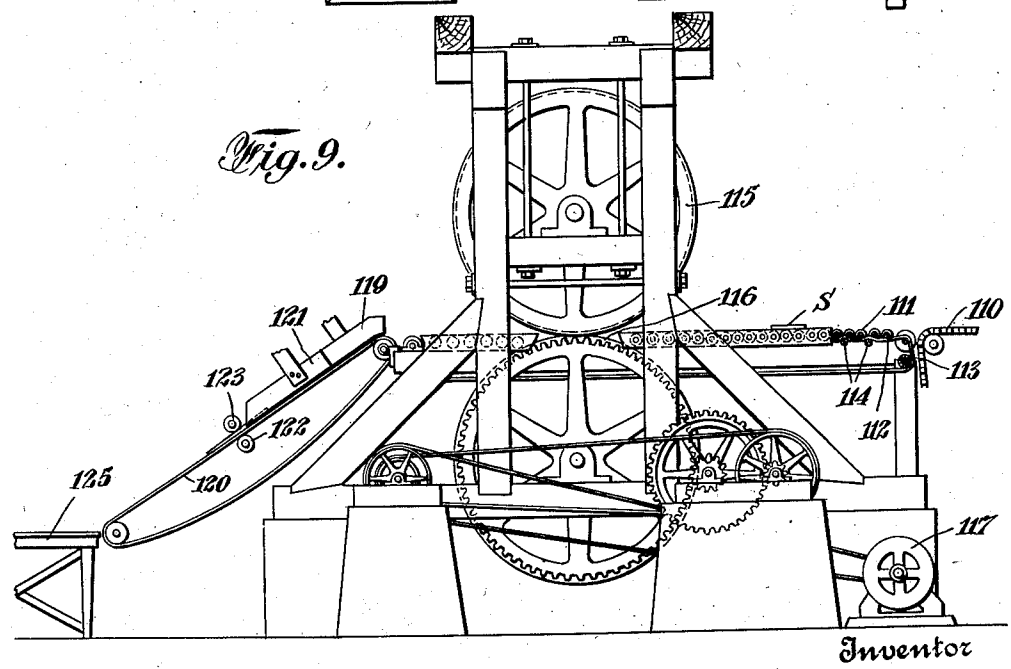


Fig. 9.



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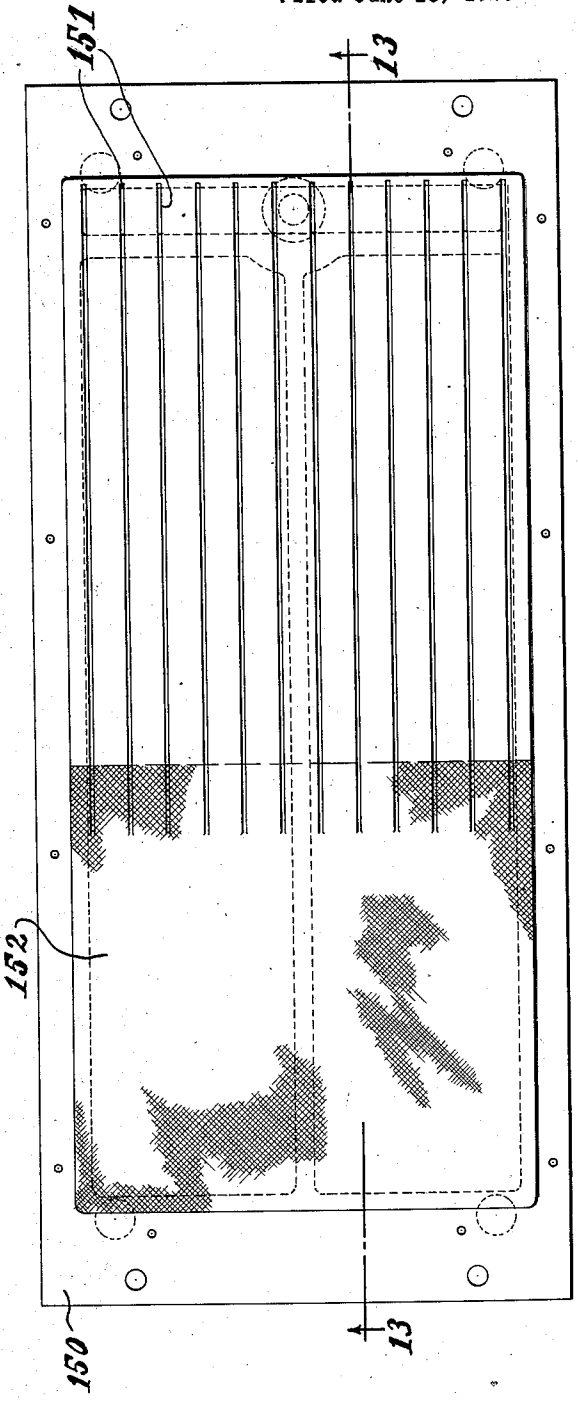


Fig. 12

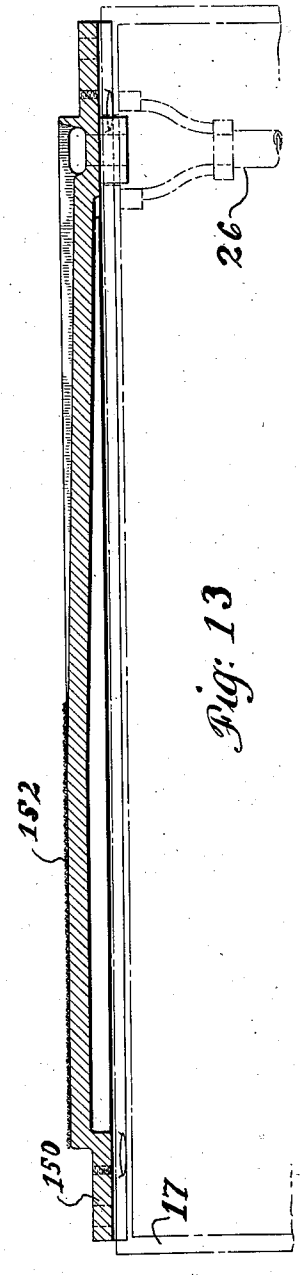


Fig. 13

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Patented Apr. 5, 1927. 1,623,612

UNITED STATES PATENT OFFICE.

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SHINGLE MACHINE.

Application filed June 16, 1926. Serial No. 116,291.

This invention relates to a method and apparatus for producing an article of plastic material such as asbestos fiber and cement composition.

Hitherto such plastic compositions have been worked into shingles, slabs and the like of flat, even form, but it is often desirable that the shape or thickness of the article be irregular, as for instance, in the case of shingles, where it is advantageous to have a taper in the long direction from thinness at one end to relative thickness at the other.

The object of this invention is to provide a method and apparatus for producing the article from plastic material and improved means whereby the general outline of each shingle or other article may be effected automatically by a machine in continuous operation. A more specific object of the invention is to provide improved vacuum means for forming the article into substantially the desired shape.

In addition to the foregoing objects, other objects of my invention are to provide certain novel features of construction and arrangement of parts which will be more apparent from the following description of the accompanying drawings, in which—

Fig. 1 is a side elevation of the shingle forming mechanism and the conveyor for transferring the same to other mechanism not shown;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a vertical longitudinal section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a section from the periphery of the drum showing the filtering cloth and cords thereon, this section being taken substantially parallel to the drum axis, as for instance, on line 4—4 of Fig. 2;

Fig. 5 is a fragmentary circumferential sectional view of the drum periphery and taken substantially on the lines 5—5 of Fig. 4;

Fig. 6 is a fragmentary plan view of the drum periphery with the filtering cloth and cords removed;

Fig. 7 is an axial section through the vacuum control valve mechanism taken substantially on the line 7—7 of Fig. 2;

Fig. 8 is a section of the valve mechanism taken substantially on the lines 8—8 of Figs. 2 and 7;

Fig. 9 is a side elevation of the pressing rollers and shingle scoring mechanism;

Fig. 10 is a plan view thereof;

Fig. 11 is one form of a shingle;

Fig. 12 is a plan view illustrating a modified form of drainboard, and

Fig. 13 is a sectional view of the same on the line 13—13 of Fig. 12.

In the illustrative embodiment of my invention I have shown in Fig. 1 a suitable frame structure including a pair of parallel side members 7, a pair of parallel floor members 8 and vertical supports 9. Other members for supporting and bracing purposes may be included so as to suitably support a slurry tank 10. This tank has an arcuate bottom and vertical sides so as to form an opening 11 in the top and has an overflow pipe 12 disposed at one edge. For the purpose of agitating and mixing the slurry in the tank 10 there is provided a series of rotatable agitators 13, each being provided with a series of radial arms. These agitators may be rotated by any suitable mechanism, such as by an individual or continuous belt or suitable gears. It will also be understood that the tank 10 is made of such material which will be best suited to the nature of the slurry used. The slurry preferably consists of the elements in proportions as previously noted.

In order to form the slurry into suitable articles such as shingles, preferably tapered, there is provided a relatively large drum D, which is mounted upon a transverse shaft 14. This shaft is rotatably supported in bearings 15 that are supported by the side frame members 7. More specifically, this drum comprises, as shown in Figs. 4 to 8, side members 16 and a peripheral portion 17. The peripheral portion could be formed of any suitable material, such as wood, metal or the like. Fixed to each of the side members 16 is a bearing support 18, which has engagement with a reduced end of the shaft 14, the member 18 having an annular groove 19 to receive the bearing 15. The drum periphery is provided with a series of parallel substantially rectangular chambers 20. Each chamber is separated by an axially extending partition 21, which has recesses 22 and 23, and a central recess which receives a sealing strip 21^a, preferably made of rubber and extending beyond the ends of

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the chambers 20 as indicated in Fig. 6. A ported supporting rib 24 extends circumferentially of the drum and is intermediate the ends of the chambers 20, thereby forming in effect two chambers. It will be noted that the bottom of each chamber 20 inclines upwardly toward the drum periphery from the central portion adjacent the support 24. Bars 25 extending circumferentially of the drum are supported in the recesses 22 and 23. These bars, it will be noted, are successively spaced closer together as the outer sides of the drum periphery are reached, the purpose of which will appear in the description of the operation. Communicating with each chamber substantially adjacent the supporting rib 24 is a vacuum pipe 26, which extends radially within the drum and has a lateral extension 27, which passes through the supporting hub 18 and is secured in a hollow flanged member 28. The member 28 is suitably secured to the hub 18 and has an angular passage 29 leading to its periphery, thereby allowing communication between a vacuum controlling member 30 and the pipe 27. As shown in Fig. 8, the member 30 is stationary and only partially surrounds the periphery of the member 28. The member 30 is divided into a minimum vacuum chamber 31 and a maximum vacuum chamber 32, pressure therein being transmitted through pipes 33 and 34 respectively. Each of the chambers has an arcuate groove 35 that communicates with the passages 29. A plate 36 is secured to the member 28 to hold the valve member 30 in operative relation to the member 28, and to prevent air leakage between the adjacent surface suitable packing 37 is provided.

From the above it will be seen that as the drum rotates each chamber 20 will be subjected to a minimum vacuum of say ten pounds when the passage 29 is in communication with the chamber 31. Upon further rotation of the drum the passage 29 will be brought into communication with the chamber 32, and thereby allow a higher degree of vacuum to be formed in the drum chambers 20. Before completing one rotation of the drum the passage 29 will communicate with the atmosphere, as clearly indicated in Fig. 8.

The object of this vacuum controlled mechanism is to permit the drum to pick up or have accumulated on its periphery a substantially predetermined amount of slurry from the tank 10 as the drum rotates therein, while the object of the successively closer spaced bars 25 and the inclined bottom of the chambers 20 is to cause a relatively large amount of plastic material or slurry to be accumulated adjacent the rib 24 while a relatively lesser amount of material will be accumulated at the outer ends of the chambers 20. However, to prevent the plastic material from being drawn through the spacing bars 25 there is provided a filtering cloth 40 covering the peripheral portion 17 of the drum and of a sufficient width to extend beyond the outer ends of the chambers 20, thereby to be supported by the drum periphery as indicated at 41. To properly position the filtering cloth on the drum periphery there is provided at each side of the drum a peripheral flange 42, preferably made of rubber, and inserted within a peripheral drum groove, while metallic peripheral bands 43 disposed on the outside of the flanges 42 prevent the latter from being forced out of shape. The filtering cloth may be of any suitable material, such as silk, linen, muslin, wire gauze or other perforated material.

In order to aid in the forming of the plastic material into substantially desired shape and to aid in holding the articles to the periphery of the drum over the chambers 20 there is provided flexible molding cords 44, preferably made from fishing line or other similar material, which are supported in the form of endless belts by the drum periphery on the top of the filtering cloth. These cords as shown in Figs 3, 4 and 5 are successively spaced closer together as the outsides of the drum periphery are reached. The cords 44 lead off the drum periphery to spacing groove in roller 45. The grooved roller 45 may be supported in any suitable manner and it is clear that it might be adjustably supported to vary the tension of the cords.

In order to initially press the plastic shingles there is provided a belt 67 which engages an arcuate portion of the drum. This presser belt leads off of the drum on to a guiding roller 68 and over and under guiding rollers 69, 70 and 71 back on to the drum. This presser belt will have sufficient transverse flexibility so that the tapered sides of the articles will be properly engaged. If for any reason it should be desired, it is obvious that the presser strip could be made separately, one part to cover each set of the parallel chambers in the drum. In order to exert further pressure, rollers 72 are carried on one end of arms 73, the other ends of which are pivotally supported by a suitable framework 74. It will be noted that the length of the arms 73 diminishes as the upper rollers are reached, and it will also be clear that the periphery of these rolls could taper inwardly towards their central portion, thereby to conform to the tapered portions of the articles, or if desired, the rollers could be split at their central portion.

In order to clean the filtering cloth and cords and to provide the necessary fluid such as water for mixing the sand fibres and cement to form the slurry there is provided within the tank 10 a transversely disposed

fluid conducting pipe 75 which is provided with nozzle openings whereby liquid is directed against the periphery of the drum. The blast of fluid will drive out any plastic material lodged in the openings of the filtering cloth and on the cords, and by the cooperation of rotary brushes 76 this material will be entirely removed from the filtering cloth and cords. The material thus removed is recovered and remixed with the slurry in the tank 10.

The mechanism for controlling the degree of vacuum in the chambers 31 and 32 comprises as shown in Figs. 1 and 2, a vacuum pump 80 of any suitable type, and which has communication with a tank 81 as by pipe 82. The tank 81 forms in effect a control tank for tanks 83 and 84, which have communication therewith as pipes 85 and 86, leading into a main pipe 87, which in turn communicates with the tank 81. Suitable pressure control valve mechanisms 88 and 89 are carried by the tanks 83 and 84 respectively. It will be clear that these valve mechanisms could be used to control the degree of pressure within each tank in addition to the mechanism now to be described. The pipes have associated with their horizontal portions 90 and 91 identical control valve mechanisms so that the description of one will suffice for both. An adjustable valve 92 may be used for throttling purposes, and by suitable adjustment any degree of vacuum could be obtained. A suitably valved by-pass 93 furnishes a further adjustment for a vacuum condition. The tank 83 has communication with the chamber 32 as by the pipe 34, which is a continuation of a valved controlled pipe 95, leading from the tank 83. The tank 84 has communication with the chamber 31 as by the pipe 33, and a suitably valved controlled pipe 96. As the vacuum in the various chambers 20 will cause water to be drawn from the plastic shingles suitable means is provided for draining this water, which will settle in the tanks 83, 84 and 81. This means comprises pumps 97 98 and 99, communicating respectively with the tanks 83, 84 and 81 by suitable pipes, all of which are adapted to discharge into a suitable collecting pipe 100. The liquid so collected may be returned to the system, for such liquid would contain a large percentage of cement and other material.

The operation of the device so far described is as follows:

The filtering cloth 40 being secured to the periphery of the drum D will rotate therewith, being supported by the strips 25 and the partitions 21, 24 and the end surfaces 41, the chambers 20 being separated by the sealing strips 21^a. The spaced cords are placed over the filtering cloth and are guided by the grooved roller 45, and are in unequally spaced position on the drum periphery. The dry sand, fibres and cement material is charged into the tank 10 and the drum D rotates by a suitable belt pulley 105, which is fixed to the drum shaft 14. At the same time the agitators 13 will be rotated to mix the sand, fibres and cement materials with the fluid from the pipe 75 and keep the slurry in a uniform condition. As the drum rotates those of the chambers or compartments 20 which are disposed within the slurry will be subjected to a minimum vacuum as by connection of the passages 29 with the minimum vacuum chamber 31. The chamber 31 communicates with the minimum vacuum tank 84 as by the pipes 93, 33, chamber 31, those of passages 29 which are in communication therewith and the pipes 27 and 26. This will cause the slurry or plastic material to be drawn against the filtering cloth 40, and cords 44 conforming to the shape of the chambers 20 which it will be remembered is suitably supported upon the series of cross bars 25. The thickness of the plastic material will be varied in accordance with the degree of vacuum, the successively closer spacing of the bars 25 and to the inclined bottoms of the chambers 20. It has been found that such a construction will cause a lesser amount of material to be held adjacent the relatively closer spaced bars 25 than will be held adjacent the widely spaced bars. By the vacuum the plastic material will be held very tightly against the filtering cloth and cords, which cords will have a tendency to be embedded in the undersurface of the article, thus aiding in maintaining the article in the periphery of the drum, as clearly shown in Figs. 4 and 5. As the portion of the drum submerged in the slurry is rotated therefrom in a counter clockwise direction, the chambers 20 will be subjected to a higher degree of vacuum due to the passages 29 coming into communication with the chamber 32. This permits the tank 83 to be placed in communication with each of the chambers as through pipes 95, 34, chamber 32, passage 29 and the pipes 27 and 26. The passages 29 rotate with the drum due to the connection of the member 28 with the hub 18, while the valve casing 30 remains stationary, with the chambers in the upper right hand portion being subjected to a higher vacuum it will be clear that water will be drawn from the plastic articles upon the drum, and this water will finally settle in the tanks 83, 84 and 81, from which it will be drawn as by the pumps 97, 98 and 99, and discharged into the collecting pipe 100. During the period that the articles are being subjected to the higher vacuum they will be in contact with the pressing belt 67, and by co-operation therewith of the series of rollers 72 even more water will be squeezed out than other-

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wise, and the upper surface of the article made uniform. As the drum continues to rotate the passages 29 will finally come into communication with the atmosphere, thereby permitting the removal of the formed articles from the drum. It will be noted that during this period the cords are gradually separated from the drum and filtering cloth, thereby causing the articles to be entirely supported by the cords. The result is that as the cords pass within the grooves of rollers 45 they are stripped from the articles S by passing downwardly around the roller 45, this action being clearly shown in Fig. 3, the articles then being discharged upon a plate 46 which directs them to a suitable conveying mechanism to permit further operations to be performed thereon.

In the manufacture of some plastic articles such as shingles it may be desirable to provide a means for coloring or coating the article or a portion thereof. Coloring or coating spray guns 47 may be provided for spraying coloring or coating material to the articles as the drum rotates and when the articles on the drum are at a minimum vacuum. As the drum rotates and is subjected to a higher degree of vacuum due to the passages 29 coming into communication with the chamber 32, the coloring or coating material on the surface of the article will be drawn into the surface of the plastic article, creating a substantial thickness of coloring or coating surface.

After discharging a plastic article from the cords it is further pressed and then the large end thereof is scored. The means for accomplishing these ends comprises a plate 46 and an endless belt conveyor 110, suitably supported and disposed so as to receive the articles S from the cords. The conveyor 110 could be driven by any suitable means and is adapted to discharge upon a conveyor 111 of the final pressing mechanism. As shown in Fig. 9, the conveyor 111 comprises a series of relatively small rollers beneath which and in contact with is a belt 112, which passes over guiding rollers 113, and is held in frictional contact with the rollers as by holding rollers 114. When the belt 112 is driven in a clockwise direction, the rollers 111 will be rotated so as to convey the shingles between a pair of co-operating press rollers 115 and 116. These rollers may be supported in any suitable manner, such as a wooden framework or the like. The upper surface of the rollers 111 will be substantially tangent to the surface of the lower roll 116, these rollers being spaced apart adjacent the pressing rolls so as to allow the latter to have full pressing contact with both sides of the articles. The periphery of the rolls is tapered with the narrower portion in the center, thereby allowing the large end of the tapered article to pass between the rollers, as shown in dotted lines in Fig. 10. The upper roller is also adjustable in any suitable means in order to press shingles or other articles of different thicknesses. The lower roller is driven by any suitable means, which herein is shown as a motor 117 and suitable driving gearing 118 for connecting the motor and roller 116.

After the articles have passed through the pressing rollers it is sometimes desired to score the upper surface thereof, although both surfaces could be scored if desired, and to accomplish this the articles are first turned so that their longitudinal axes will be parallel with the direction of travel. The means for turning the articles from the transverse position as shown in Fig. 10 to the longitudinal position comprises a pair of guiding abutment walls 119, which lie over a conveyor belt 120, and terminate adjacent the end of the roller conveyor 111. A pair of secondary flared guiding walls 121 terminate somewhat short of the extended ends of the walls 119, thereby permitting the articles S as they come from the conveyor 111 to engage the extended ends of the walls 119 at a point offset from the center of gravity of the article, and upon continued movement of the article due to the conveyor 111, the outer end of the article will be swung around on to the conveyor 120 until it is substantially in alignment with the space between the walls 119 and 121, whereby it will be carried forwardly on the conveyor 120 and properly guided between a scoring mechanism.

The scoring mechanism comprises a roller 122 for supporting the articles as they are run under scoring rollers 123. The scoring rollers might have any suitable design formed on their periphery so as to mark the upper side of the large end of a tapered shingle accordingly, but the rollers are specifically shown as provided with a series of peripheral V-shaped grooves. The rollers 123 are suitably spaced from the supporting rollers 122 so that only a portion of the upper surface of the article will be scored. After passing through the scoring mechanism the articles may be discharged from the belt 120 on to any suitable device 125. Instead of turning the shingles prior to marking thereof they may be fed through the scoring mechanism in a transverse position thereby transversely marking the shingles. If a longitudinal marking is desired without turning the shingle the scoring roller could have its periphery provided with axially extending grooves.

While I have specifically shown a drum with which the filtering cloth and cords may co-operate, it will be clear that the cloth and cords might be made to pass in a flat plane, in which position a flat conveyor belt could

be used for supporting the cloth and cords and that other or modified apparatus could be used to produce the shingle.

By applying this invention to shingle manufacture it is noted that by tapering the shingle, material is saved in addition to providing a shingle made from plastic material which has all of the requisite structural qualities. It is also apparent from the general principles employed in my machine that the shingle edges could be made irregular, so as to give the effect that the shingle had been shaped merely by chipping off with a hammer, such as is done with certain types of quarried shingles. As shown in Fig. 11 the upper exposed surface could be given a desired irregular shape. This surface could also be given the effect as though having been chipped simply by suitably designing the periphery of either the scoring or pressing rolls. Obviously, if desired a straight reciprocating type of press might be used. Even though the shingle be provided with a highly irregular or roughened surface, still they may be laid without any trouble due to the thin end of the shingle being smooth as is also preferably the lower surface of the large end. However, if desired the lower shingle surface adjacent only the edges of the large end may be given this chipped appearance, thereby leaving the remaining under surface flat so as to facilitate laying of the shingles.

The method of this invention is especially adaptable to the production of the shingle having the composition above set forth. More specifically, the proportions of the respective elements are asbestos fibre about 3/8" long 5%, asbestos short fibre 20%, sand 30%, and cement 45%. The suction draws the slurry against the filtering cloth and collects it there, and the continued suction tends to draw the lighter more fluid elements of the slurry inwardly through the mass so as to make it more compact and solid, and to stop up any open pores. The resulting shingles while conforming in general outline to each other will differ in details of surfacing so that no two shingles will be exactly alike. The suction effect at the surface, depending at every point on the accumulation and matting of the material beneath gives a widely variable roughened appearance to the surface. The thickness and taper may be readily varied by altering the amount and distribution of the suction. By making the edges of the suction chambers irregular where they contact with the filtering cloth or belt 40, the edges of the shingle will be correspondingly increased in irregularity to any desired extent, to give, for instance, the effect of edges hand-chipped by a hammer as with some types of quarried shingles. A similar effect could be produced by suitably forming the periphery of either the scoring or pressing rolls. The roughness of the upper exposed surface of the shingle may be made more irregular by an irregular formation of the supporting means beneath the filtering cloth, resulting in a variable suction effect across the shingle with corresponding local areas of thinness or depression.

The shingles are composed of a wearing, weather-proof composition consisting of sand, cement and fibres. The fibres are embedded throughout the composition and are matted and entangled by the suction action and subsequent pressing so as to be substantially parallel to the surface of the shingle. The parallel formation of the fibres through the shingle strengthens the shingle and also aids in combining the sand and cement into a strong homogeneous mass.

The tapered form of the shingle may be made by progressively reducing the vacuum across any dimension of the slurry pickup surface; for instance, the supporting surface may have a gradually thickening layer of porous material over it, or instead of the grid-like structure above described each shingle compartment may have a drainboard in the form of a flat slab of wood or metal with grooves gradually deepening from shallowness at the thin end of the shingle to greater depth at the thickening end of the shingle, each of these grooves communicating with the individual vacuum compartment at this larger end so that there is a direct and relatively high vacuum drawing on the material at the deeper ends of the grooves and a lighter vacuum at the more remote shallower ends of the grooves. Such a drainboard is shown in Figs. 12 and 13 where 150 is the drainboard and 151 are the gradually deepening grooves. Over a portion of the groove surfaces of the board is a fabric or netting 152 carrying the belt upon which is deposited the plastic material.

I claim:

1. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords associated therewith adapted to remove said mass as a unit while preserving its shape, and means whereby a vacuum in said chamber effects the holding of said plastic material to said cords.

2. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords associated with said chamber adapted to remove said mass as a unit while preserving its shape, and perforated means interposed between said cords and chamber.

3. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords adapted to remove said mass as a unit while preserving its shape, and vacuum controlled means for drawing liquid from plastic material on said cords.

4. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape and cords removably associated therewith adapted to remove said mass as a unit while preserving its shape, and means whereby a vacuum in said chamber effects holding of plastic material to said cords, said cords being removable upon relieving the chamber of its vacuum.

5. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, filtering means covering said chamber, and flexible cords supportable on said filtering means separable therefrom and adapted to remove said mass as a unit while preserving its shape.

6. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, filtering means covering said chamber, a series of flexible cords above said filtering means adapted to remove said mass as a unit while preserving its shape, and means for suitably supporting said cords, whereby when said chamber is subjected to a vacuum said cords will be held tightly in position against said member.

7. A device for forming tapered shingles from plastic material, comprising a plastic material tank and a rotatable drum having vacuum chambers therein for forming said plastic material into a unitary mass, cords carried by said drum over said chambers and to be passed through material in said tank, and means whereby material is deposited on said cords in varying thicknesses when said cords pass through the plastic material tank.

8. A machine for forming tapered shingles from plastic material, comprising a drum having vacuum passages therein for forming said plastic material into a unitary mass, flexible cords disposable on the periphery thereof, a tank having plastic material through which said cords may pass when supported by said drum, means whereby material is drawn on to said drum and cords in varying thicknesses when passed through the material, and means for removing the cords and formed shingles from the drum while preserving their shape after passing through said tank.

9. A machine for forming articles from plastic material, comprising means forming an endless supporting surface having vacuum passages therein, an endless filtering cloth disposable over said passages, endless cords disposable on said cloth, and a plastic material tank through which said endless members may pass when in co-operation with each other, whereby material will be drawn to said endless members in a unitary mass of desired shape.

10. A machine for forming articles from plastic material, comprising means forming an endless supporting surface having vacuum passages therein, an endless filtering cloth disposable over said passages, endless cords disposable on said cloth, a plastic material tank through which said endless members may pass when in co-operation with each other, whereby material will be drawn to said members in a unitary mass of desired shape, and means for removing said cords from said filtering cloth after the article is formed while preserving its shape.

11. A machine for forming articles from plastic material, comprising means forming an endless supporting surface, endless cords supported thereby, means for forming a plastic article in a unitary mass of desired shape on said cords when the latter is in cooperation with said supporting surface, and means for thereafter separating said cords from said surface and ejecting the formed plastic article from said cords while preserving its shape.

12. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, endless cords supportable on said filtering cloth over said vacuum passages and said filtering cloth, a tank having plastic material through which said cords and drum are movable, whereby the vacuum effects deposit of material over said vacuum passages and said cords, and means for pressing the outer surface of the plastic material on said drum after the same has passed through said tank.

13. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, endless cords supportable on said filtering cloth and over said vacuum passages and said filtering cloth, a tank having plastic material through which said cords and drum are movable, whereby the vacuum effects deposit of material, to said drum over said vacuum passages and said cords, means for

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pressing the outer surface of the plastic material on said drum after the same has passed through said tank, and means for relieving said pressure action upon further predetermined movement of said drum.

14. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, an endless strip formed by a series of cords supportable on said filtering cloth and over said vacuum passages and said filtering cloth, a tank having plastic material through which said strip and drum are movable, whereby the vacuum will effect deposit of material to said strip, means for pressing the outer surface of the plastic material to said strip after the same has passed through said tank, means for relieving said pressing action upon further predetermined movement of said drum, and means for removing said strip from said drum periphery when the pressing action is relieved.

15. A machine for forming plastic articles, comprising a rotatable drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, endless cords spaced closer together as the outsides of the drum periphery are reached supportable on said filtering cloth over said vacuum passages and filtering cloth, a tank having plastic material through which said cords and drum are movable, whereby the vacuum effects deposit of material to said drum, means for pressing the outer surface of the plastic material to said drum after the same has passed through said tank, means for relieving said pressing action upon further predetermined movement of said drum, means for removing said cords from said drum periphery when the pressing action is relieved, and means for discharging the plastic article from said cords.

16. A machine for forming articles from plastic material, comprising a drum having drainage passages in the periphery thereof, a filtering cloth disposed over said passages, endless flexible cords engageable with the drum periphery, means for directing the cords from and on to the drum periphery, whereby plastic material will be deposited thereon while in contact with said drum, and said articles may be removed from said strip when the latter is free of the drum periphery.

17. A machine for forming articles from plastic material comprising a drum having flexible spaced cords thereon, means for placing plastic material in a unitary mass of desired shape on said drum over said cords, a flexible presser belt adapted to overlie said cords and drum after the plastic material has been placed on said drum, pressing rollers engaging said belt, and means for discharging the plastic articles as a unit from said cords after said pressing belt disengages the cords and drum while preserving their shape.

18. A machine for forming articles from plastic material, comprising continuously moving cords, means for placing plastic material over said cords in a unitary mass of desired shape during continuous movement thereof, means for pressing the same, means for discharging the pressed article while preserving its shape, and means for drawing excessive water from the articles when disposed on said cords.

19. A machine for forming articles from plastic material, comprising a supporting member forming said plastic material into a unitary article of desired shape, a filtering member, and flexible cords carried by said supporting member adapted to remove said article as a unit while preserving its shape, and means for cleaning said supporting member, cords and filtering cloth.

20. A machine for forming articles from plastic material, comprising a supporting member forming said plastic material into a unitary article of desired shape, a filtering screen and cords carried by said supporting member adapted to remove said article as a unit while preserving its shape, and means for cleaning said filtering cloth, said latter means including a nozzle for subjecting said screen to fluid pressure from one side thereof.

21. A machine for forming articles from plastic material, comprising a supporting member forming said plastic material into a unitary article of desired shape, a filtering screen and cords carried by said supporting member adapted to remove said article as a unit while preserving its shape, and means for cleaning said filtering cloth, said latter means including a nozzle for subjecting said screen to fluid pressure, and a brush for cleaning the material from the cloth.

22. A machine for forming articles from plastic material, comprising a tank, a drum forming said plastic material into a unitary mass of desired shape, cords supported on the periphery thereof and movable with said drum through plastic material in said tank adapted to remove said mass as a unit while preserving its shape, and agitating means disposed in said tank.

23. A machine for forming articles from plastic material, comprising a tank, a drum forming said plastic material into a unitary mass of desired shape, cords supported on the periphery thereof and movable with said drum through plastic material in said tank adapted to remove said mass as a unit while preserving its shape, and agitating means interposed between the drum periphery and the tank walls.

24. A machine for forming articles from

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plastic material, comprising a member having a supporting surface forming said plastic material into a unitary mass of desired shape, a vacuum passage extending therethrough, flexible cords adapted to be supported on said surface and adapted to remove said mass as a unit while preserving its shape, and means for subjecting the cords to sub-atmospheric pressure, thereby causing said flexible cords to be held more closely to the supporting surface.

25. A machine for forming articles from plastic material, comprising a supporting member for forming said plastic material into a unitary mass of desired shape and cords carried thereby adapted to remove said mass as a unit while preserving its shape, and means for subjecting the same successively to different degrees of sub-atmospheric pressure, and finally to atmospheric pressure.

26. A machine for forming articles from plastic material, comprising a supporting member forming said plastic material into a unitary mass of desired shape, and cords carried thereby adapted to remove said mass as a unit while preserving its shape, and means for subjecting the same successively to different degrees of sub-atmospheric pressure, and finally to atmospheric pressure, said latter means including relatively rotatable controlling members, one of which has chambers within which different predetermined sub-atmospheric pressures are maintained, said member also presenting an atmospheric space, the other of said controlling members having a passage communicating with said supporting member, said passage being connectible with said chambers or atmospheric space.

HARRY APPLIN.

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DISCLAIMER.

1,623,612.—*Harry Applin*, Ambler, Pa. SHINGLE MACHINE. Patent dated April 5, 1927. Disclaimer filed July 3, 1929, by the assignee, *Ambler Asbestos Company*.

Hereby enters this disclaimer to that part of the claim in said specification which is in the following words, to wit:

"1. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords associated therewith adapted to remove said mass as a unit while preserving its shape, and means whereby a vacuum in said chamber effects the holding of said plastic material to said cords.

"2. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords associated with said chamber adapted to remove said mass as a unit while preserving its shape, and perforated means interposed between said cords and chamber.

"3. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, cords adapted to remove said mass as a unit while preserving its shape, and vacuum controlled means for drawing liquid from plastic material on said cords.

"4. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape and cords removably associated therewith adapted to remove said mass as a unit while preserving its shape, and means whereby a vacuum in said chamber effects holding of plastic material to said cords, said cords being removable upon relieving the chamber of its vacuum.

"5. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, filtering means covering said chamber, and flexible cords supportable on said filtering means separable therefrom and adapted to remove said mass as a unit while preserving its shape.

"6. A mechanism for forming plastic material into plates, slabs and the like, comprising a member having a vacuum chamber forming said plastic material into a unitary mass of desired shape, filtering means covering said chamber, a series of flexible cords above said filtering means adapted to remove said mass as a unit while preserving its shape, and means for suitably supporting said cords, whereby when said chamber is subjected to a vacuum said cords will be held tightly in position against said member.

"7. A device for forming tapered shingles from plastic material, comprising a plastic material tank and a rotatable drum having vacuum chambers therein for forming said plastic material into a unitary mass, cords carried by said drum over said chambers and to be passed through material in said tank, and means whereby material is deposited on said cords in varying thicknesses when said cords pass through the plastic material tank.

"8. A machine for forming tapered shingles from plastic material, comprising a drum having vacuum passages therein for forming said plastic material into a unitary mass, flexible cords disposable on the periphery thereof, a tank having plastic material through which said cords may pass when supported by said drum, means whereby material is drawn on to said drum and cords in varying thicknesses when passed through the material, and means for removing the cords and formed shingles from the drum while preserving their shape after passing through said tank.

"9. A machine for forming articles from plastic material, comprising means forming an endless supporting surface having vacuum passages therein, an endless filtering cloth disposable over said passages, endless cords disposable on said cloth, and a plastic material tank through which said endless members may pass when in cooperation with each other, whereby material will be drawn to said endless members in a unitary mass of desired shape.

"10. A machine for forming articles from plastic material, comprising means forming an endless supporting surface having vacuum passages therein, an endless filtering cloth disposable over said passages, endless cords disposable on said cloth, a plastic material tank through which said endless members may pass when in co-

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operation with each other, whereby material will be drawn to said members in a unitary mass of desired shape, and means for removing said cords from said filtering cloth after the article is formed while preserving its shape.

"11. A machine for forming articles from plastic material, comprising means forming an endless supporting surface, endless cords supported thereby, means for forming a plastic article in a unitary mass of desired shape on said cords when the latter is in cooperation with said supporting surface, and means for thereafter separating said cords from said surface and ejecting the formed plastic article from said cords while preserving its shape.

"12. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, endless cords supportable on said filtering cloth over said vacuum passages and said filtering cloth, a tank having plastic material through which said cords and drum are movable, whereby the vacuum effects deposit of material over said vacuum passages and said cords, and means for pressing the outer surface of the plastic material on said drum after the same has passed through said tank.

"13. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, endless cords supportable on said filtering cloth and over said vacuum passages and said filtering cloth, a tank having plastic material through which said cords and drum are movable, whereby the vacuum effects deposit of material, to said drum over said vacuum passages and said cords, means for pressing the outer surface of the plastic material on said drum after the same has passed through said tank, and means for relieving said pressure action upon further predetermined movement of said drum.

"14. A machine for forming plastic articles, comprising a rotatable supporting drum having vacuum passages therein, an endless filtering cloth disposable on the periphery of said drum to cover said passages, an endless strip formed by a series of cords supportable on said filtering cloth and over said vacuum passages and said filtering cloth, a tank having plastic material through which said strip and drum are movable, whereby the vacuum will effect deposit of material to said strip, means for pressing the outer surface of the plastic material to said strip after the same has passed through said tank, means for relieving said pressing action upon further predetermined movement of said drum, and means for removing said strip from said drum periphery when the pressing action is relieved."

"16. A machine for forming articles from plastic material, comprising a drum having drainage passages in the periphery thereof, a filtering cloth disposed over said passages, endless flexible cords engageable with the drum periphery, means for directing the cords from and on to the drum periphery, whereby plastic material will be deposited thereon while in contact with said drum, and said articles may be removed from said strip when the latter is free of the drum periphery.

"17. A machine for forming articles from plastic material comprising a drum having flexible spaced cords thereon, means for placing plastic material in a unitary mass of desired shape on said drum over said cords, a flexible presser belt adapted to overlie said cords and drum after the plastic material has been placed on said drum, pressing rollers engaging said belt, and means for discharging the plastic articles as a unit from said cords after said pressing belt disengages the cords and drum while preserving their shape.

"18. A machine for forming articles from plastic material, comprising continuously moving cords means for placing plastic material over said cords in a unitary mass of desired shape during continuous movement thereof, means for pressing the same means for discharging the pressed article while preserving its shape, and means for drawing excessive water from the articles when disposed on said cords."

"24. A machine for forming articles from plastic material, comprising a member having a supporting surface forming said plastic material into a unitary mass of desired shape, a vacuum passage extending therethrough, flexible cords adapted to be supported on said surface and adapted to remove said mass as a unit while preserving its shape, and means for subjecting the cords to sub-atmospheric pressure, thereby causing said flexible cords to be held more closely to the supporting surface.

"25. A machine for forming articles from plastic material, comprising a supporting member for forming said plastic material into a unitary mass of desired shape and cords carried thereby adapted to remove said mass as a unit while preserving its shape, and means for subjecting the same successively to different degrees of sub-atmospheric pressure, and finally to atmospheric pressure.

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"26. A machine for forming articles from plastic material, comprising a supporting member forming said plastic material into a unitary mass of desired shape, and cords carried thereby adapted to remove said mass as a unit while preserving its shape, and means for subjecting the same successively to different degrees of sub-atmospheric pressure, and finally to atmospheric pressure, said latter means including relatively rotatable controlling members, one of which has chambers within which different predetermined sub-atmospheric pressures are maintained, said member also presenting an atmospheric space, the other of said controlling members having a passage communicating with said supporting member, said passage being connectible with said chambers or atmospheric space."

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