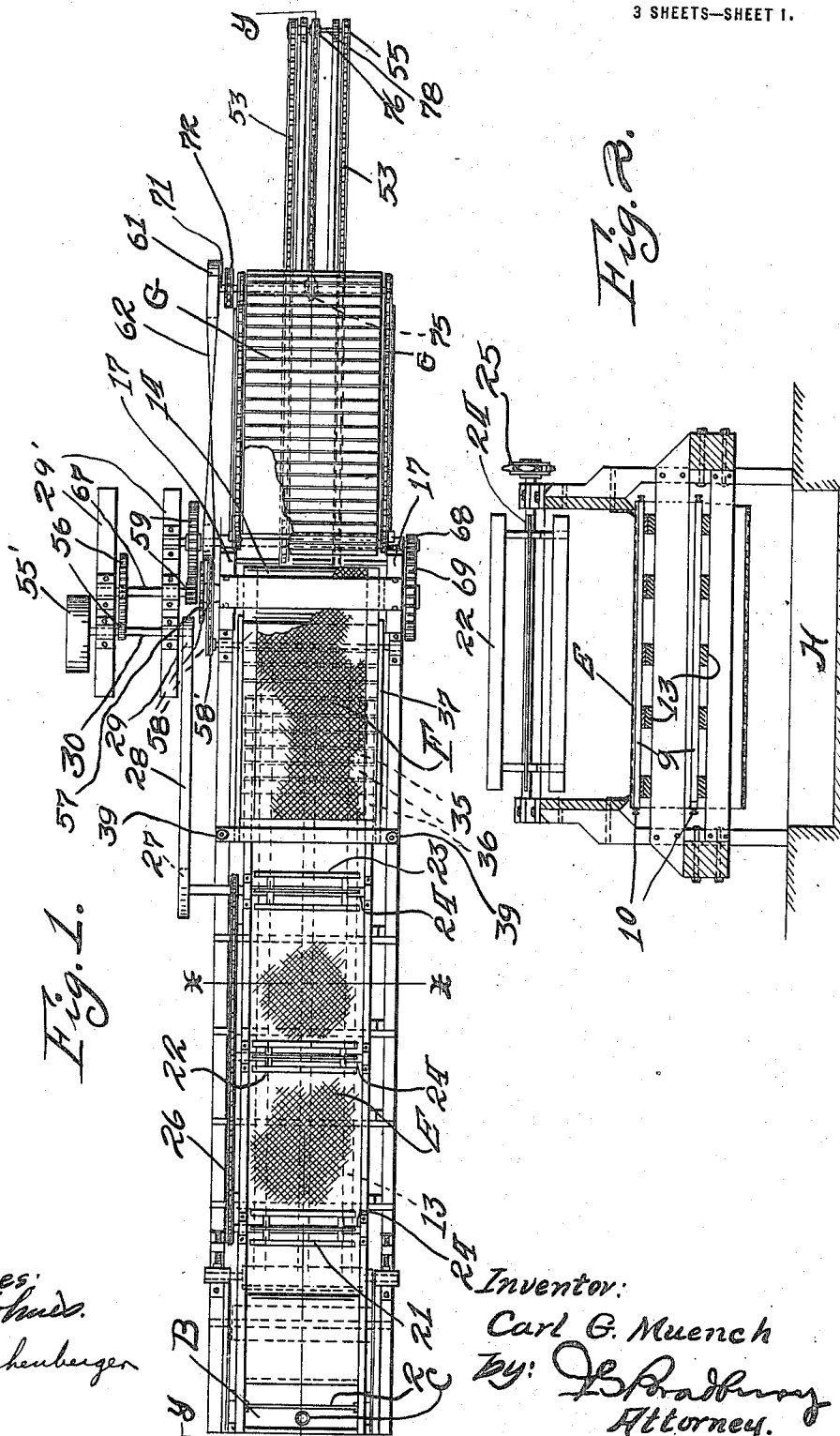


C. G. MUENCH.
FELTING MACHINE.
APPLICATION FILED AUG. 13, 1914.

1,187,476.

Patented June 13, 1916.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

Fig. 3.

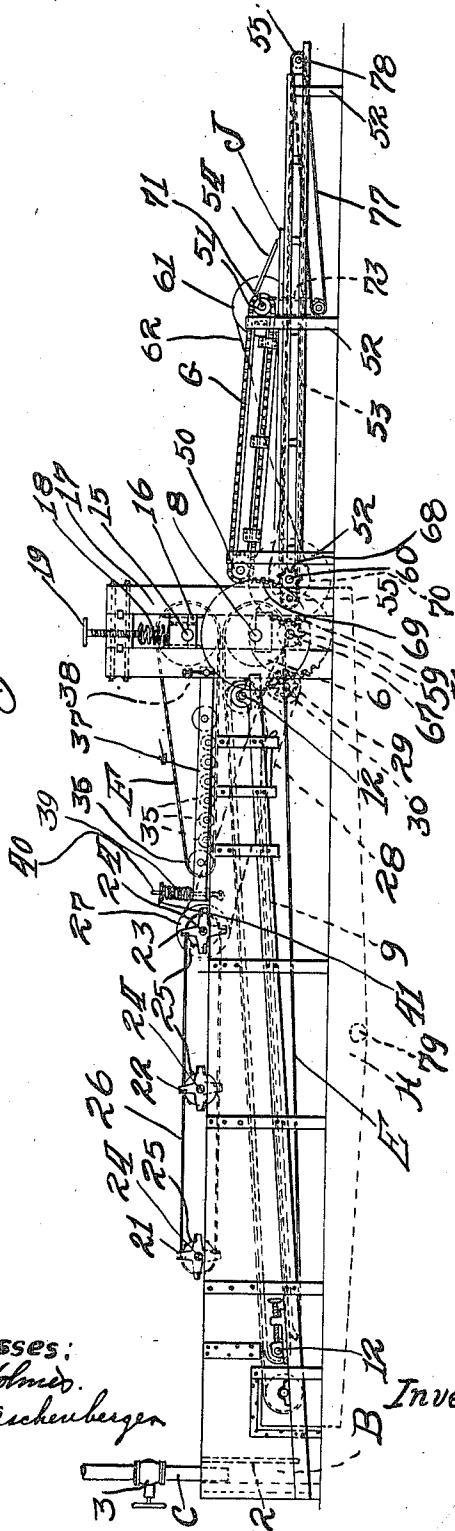
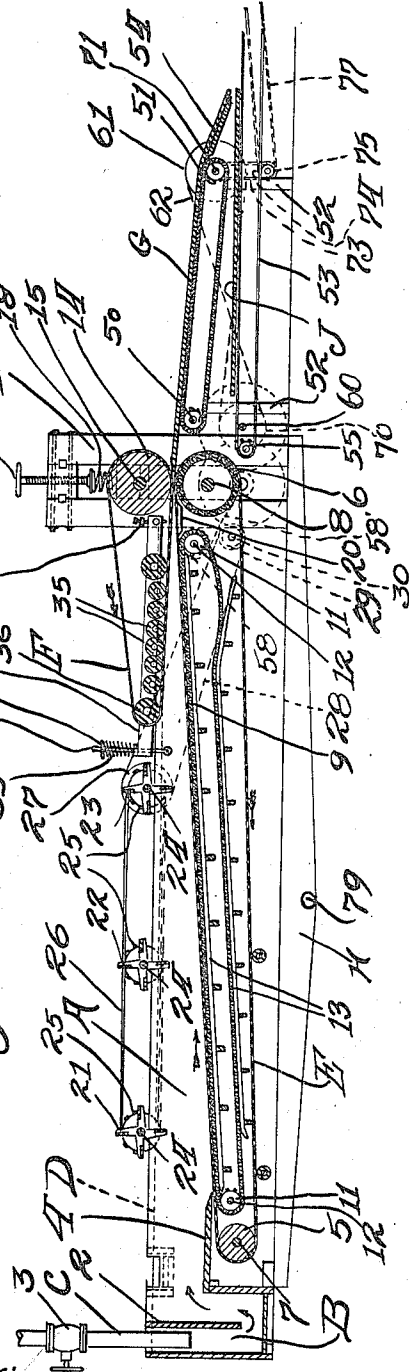


Fig. 4.



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3 SHEETS—SHEET 3.

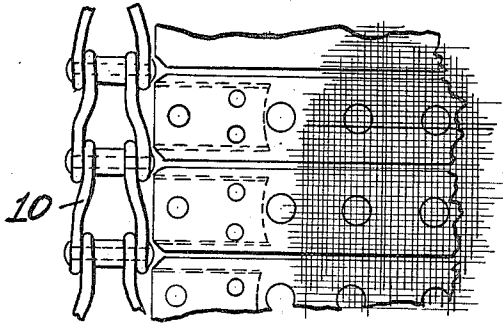


Fig. 6.

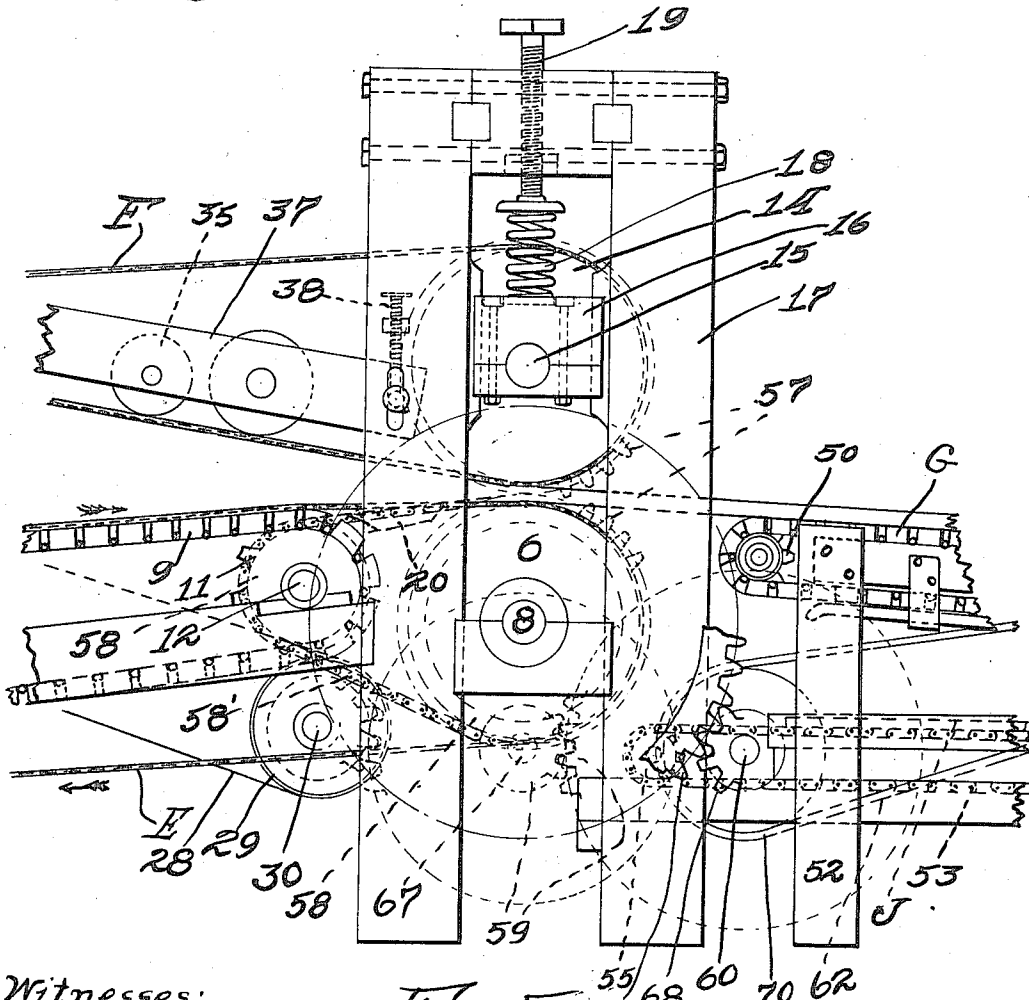


Fig. 5.

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UNITED STATES PATENT OFFICE.

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FELTING-MACHINE.

1,187,476.

Specification of Letters Patent.

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Application filed August 13, 1914. Serial No. 856,614.

To all whom it may concern:

Be it known that I, CARL G. MUENCH, a citizen of the United States, residing at International Falls, in the county of Kooch-
5 icking and State of Minnesota, have invented a new and useful Improvement in Felting-Machines, of which the following is a specification.

The object of my invention is the produc-
10 tion of a machine which is particularly adapted for felting the tailings, screenings or other products received from a pulp mill whereby said material is formed into a
15 strip, sheet or plate of any thickness suitable for insulating structures from heat and cold and protecting against the trans-
mission of sound.

A further object is the production of a machine which will economically manufac-
20 ture a product out of said material of even texture and of sufficient strength to enable its use for general structural purposes.

To these ends my invention comprises the features of construction and combination
25 of parts, which will be hereinafter described and particularly pointed out in the claims.

In the accompanying drawings forming part of this specification, Figure 1 is a plan of my invention; Fig. 2 is a section on the
30 line X—X of Fig. 1; Fig. 3 is a side elevation; Fig. 4 is a longitudinal section taken on the line Y—Y, of Fig. 1; Fig. 5 is a side view of a detail of the invention, and Fig. 6 is a plan of a detail showing a portion of
35 a screen and one of the belts which carries the screen.

In the drawings, A indicates a tank formed with a receiver B in one end into which a baffle board 2 depends. A feed
40 pipe C having a controlling valve 3 is adapted to admit a mixture of long and short wood fibers and water constituting the tailings or screenings emitted from a pulp mill, into the receiver and below the baffle board,
45 said tailings or screenings being what I choose to term the "stock" hereinafter referred to. It will however be understood that any other suitable material may constitute the stock. This stock is maintained
50 in the tank at substantially the level indicated by the broken line D, and flows across a short horizontal shelf 4 from the receiver on to an endless main belt strainer E, made preferably out of intermeshing fine wire and
55 traveling over rollers 5 and 6, which are carried respectively by shafts 7 and 8, said

shafts in turn being journaled in the sides of the tank. This belt strainer is adapted to travel in the direction of the arrows from a low point at one end of the tank immedi-
60 ately below the shelf 4 to a high point at the other end and is mounted upon a carrier belt 9 composed of open work material such as transverse slats carried by endless chains 10, traveling over sprockets 11, said
65 sprockets being mounted upon shafts 12, which are journaled in the sides of said tank. Below each of the sides of the carrier belt 9 is positioned a stationary perforated table such as 13, which admits of the
70 water which is strained by the strainer belt and carrier belt passing below into a catch basin H having a suitable outlet (not designated). At the delivery end of the tank end of the strainer belt E are two coöperating
75 expressing or pressure rollers 6 and 14. The roller 6 receives and carries the strainer belt E and a portion of belt F constituting an auxiliary strainer on the periphery of roller 14 presses against the surface of that
80 portion of the belt E passing around roller 6 so as to express liquid and moisture from the stock traveling between said belt surfaces. The roller 14 is preferably solid and mounted upon the shaft 15, which in turn
85 is journaled in journal blocks such as 16 gibbed in a guide frame 17 and urged down toward roller 6 by the adjusting springs 18, said springs being held under compression such as by hand operated screws 19 for in-
90 creasing or decreasing the pressure between the adjacent surfaces of strainer belts E and F. The roller 6 is slatted or perforated so as to drain any residue on the under surface of the upper side of the belt strainer
95 E as the latter passes around roller 14. A short plate 20 carried by the sides of the tank is interposed between the end of belt 9 and roller 14, to support the adjacent portion of strainer belt E.
100

Placed in the tank and journaled in its sides are a plurality of agitators 21, 22 and 23, the shafts 24 of which carry sprockets 25 which are driven by chain belts 26 and receive initial motion by a pulley 27 and a
105 belt 28 passing over a drive pulley 29 carried by a counter shaft 30 journaled on side supports 29'. These agitators are for the purpose of keeping the stock in the tank in motion and preventing any of the stock
110 which rises to the surface from collecting. Interposed between the paddle wheels and

the pressure roller 14 is said auxiliary belt strainer or evenner F, one side of which passes under a series of idle rollers 35 and around an end idle roller 36 at the receiving end of said series. This strainer which is composed of fine mesh wire receives motion from the pressure roller 14, around which it also passes, so that the strainer belt F will move forward at the same surface speed and in the same direction as the roller 14 and belt E. The strainer belt F moves over the top of the wet stock and is adapted on account of the adjacent surfaces of the belts F and E converging as they approach the pressure rollers 6 and 14 to gradually increase pressure upon the stock as they move it forward and eject it.

The series of rollers 35 are suitably journaled in a superimposed frame 37, one end of which situated nearest the pressure roller 14 is pivotally supported from the sides of the guide frame 17 by vertically adjustable supports 38. The opposite end of said frame is carried below compression springs 39 by adjustable supports 40, the latter carrying hand wheels 41 by the turning of which the tension of said springs is varied. At the delivery end of the machine there is a delivery or receiving carrier apron G in the form of an endless slatted apron carried by sprocket wheels 50 and 51 journaled upon suitable supports 52. Below this slatted apron is a chain belt carrier 53 operating in the same direction as the upper side of carrier belt G, said chain carrier being employed to carry freely disposed trays such as J forward at the same rate of speed as the apron G travels so as to convey the product from apron G. At the delivery end of the carrier apron G is a slide or chute 54, which is adapted to guide the felted material upon each tray. The chains 53 constituting part of the carrier pass over sprockets 55, the shafts of which are journaled in the frames 52 and 17.

Suitable driving mechanism is employed for operating the aprons or belts E, F and G, the pressure rollers 6 and 14 and the carrier 53 at substantially the same surface speed, it being noted that the belt strainer E is moved forwardly and its upper side supported by the slatted apron 9 on the supporting table 13, so that substantially no tensile strain is imparted to the strainer. The power for driving the pressure rollers 6 and 14 is transmitted from the main drive pulley 55', through a train of gears 56; shaft 67, journaled in side supports 29', gears 59, shaft 60, gears 68 and 69, the latter gear being mounted upon shaft 8 carrying the roller 6, it being noted that the shafts 8 and 15 carry intermeshing gears 57 by which both rollers are caused to revolve at the same surface speed. The power for operating the carrier belt 9 is through

sprockets 58 and chain 58'. Power for driving the strainer or evenner belt F is directly from the pressure roller 14 and power for driving the delivery carrier G is from a pulley 70 on shaft 60, cross belt 62 and another pulley 61 on the shaft 71, which carries sprockets 51 over which the belt travels. The carrier chains 53 for the trays J receive driving power from the shaft 71 by sprocket 72 on said shaft, a chain belt 73 traveling over said sprocket and another sprocket 74, which is journaled on the frame supports 52 and a pair of sprockets 75 and 76 over which a chain belt 77 travels, said sprocket 76 being carried by the shaft 78 carrying the outer end of the carrier belt 53.

The tailings or screenings constituting stock as received from a pulp mill are admitted to the receiving portion B of the tank A and kept at about the level of line D, (see Fig. 4). This stock passes in the direction of the arrows under the baffle board 2 and across the short shelf 4 in the tank and on to the upper side of belt strainer E. Immediately the water commences to pass through the belt strainer E and slatted apron 9, down into the pit or basin H in the lower portion of the tank and out through a drain 79. As the belt strainer E moves upward and forward it gathers the stock and the water continues to flow through and deposit a layer of long coarse fibers on the strainer or screen. This continues to take place the entire length of the upper side of the strainer. In order to press out more water and make the sheet of material in prime condition and of suitable even consistency to effectively submit to necessary pressure for finishing the felting process without crushing or squashing, the rollers 35 with the strainer F passing around them, effect a gradual and increasing pressure upon the mass of wet mushy pulp, so that by the time it reaches the heavy pressure rollers 6 and 14, it is of even consistency and shape. The thickness of the sheet of material delivered from between the apron or strainers E and F can be varied by the height of the stock line D or by the speed of the slatted carrier belt 9 with the strainer E. The density of the material and also the thickness can be varied by the pressure spring 18. The belt carrier supported by the table 13 supports the upper side of the screen E and acts as a parting element between said parts to prevent the stock adhering to the table and causing friction and excessive loss of power. It also prevents loss of product by preventing the same squeezing through the screen. As there is considerable air that gets mixed with the stock when it flows into tank A, there is quite an amount of stock that will tend to rise to the surface and gather and float around in bunches, therefore agitators

22 keep the surface in motion and the stock thoroughly mixed. These agitators also act as auxiliary means to urge the stock forwardly and downwardly so as to assist in gathering the fibrous stock upon the main belt. After the sheet of product has been ejected from between the strainers E and F, and delivered upon the delivery carrier G, it is cut by hand to length and then passes down over the chute or slide 54 and on to a tray J which has previously been placed by hand on the carrier belts 53. The tray with the product thereon is then placed in a dry kiln where it is dried. The auxiliary pressing mechanism consisting of the rollers 35 and strainer F can be considerably longer or shorter than as illustrated to accommodate the condition of the stock. Finer stock requires a longer pressing device and coarser stock a proportionably shorter one. If necessary this auxiliary pressing arrangement can be extended back to where the stock is delivered into the tank. The small rollers 67 journaled in the sides of the tank are for the purpose of supporting the strainer E returning to the roller 5 without the product adhering to the surface of its upper side and can be placed at any necessary points. The slatted carrier belt supporting the strainer belt E and in combination with the auxiliary pressing device consisting of the train of rollers 35 and strainer F is particularly advantageous by gradually expressing water from the stock as it approaches the pressure rollers 6 and 14 and by preparing the stock, so that it is of even consistency and in prime condition to advance toward the point of greatest pressure. By the use of the strainer belt E supported by the slatted apron 9 a height of stock can be secured, which will deposit a much thicker layer of stock upon the screen, than any method heretofore employed, and this in combination with the gradual pressing of the product by strainer F, produces a thick sheet of material having any density that is desired, said sheet being of such consistency as to have great tensile strength and to be flexible and tough permitting it to be folded and stored away. This invention has the advantage over a wet machine by being almost unlimited in its capacity to separate the fibers from the water in the stock and by forming the felted stock into a continuous sheet of single thickness instead of in strata.

In accordance with the patent statutes, I have described the principles of operation of my invention together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the construction shown is only illustrative and that the invention can be carried out by other means and applied to uses other than those above

set forth within the scope of the following claims.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. A machine of the kind described comprising a tank, an endless strainer belt disposed for movement within said tank, a stationary perforated table for supporting the upper surface of said strainer belt to reduce tensile strain thereon, and a parting element movably disposed between said strainer belt and said supporting table as and for the purpose specified.

2. A felting machine, comprising, in combination, an endless strainer traveling from a low point to a high point, an endless evenner above said strainer and traveling from a high point to a low point near the delivery end of said strainer, the high end of said evenner being urged downwardly under spring pressure and the low point pivotally supported to permit of said swinging movement, a stock holding tank in which said strainer and evenner are mounted to cause the stock to flow between the adjacent surfaces of said screen and evenner, a pair of pressure rollers at the delivery ends of said strainer and evenner, the lower of said pressure rollers being composed of open work material to admit of part of the water expressed by the strainer and evenner passing below, means for adjusting the pressure exerted by said pressure rollers and a delivery apron arranged to receive the felted product from said strainer and evenner.

3. A machine of the kind described comprising a tank, an endless strainer belt disposed for movement within said tank, a stationary perforated table spaced below the upper surface of said strainer belt, and a parting element movably disposed between said strainer belt and said table to alleviate friction and loss of power.

4. A felting machine, comprising a tank forming a receiver into which a mixed stock of fiber and water is introduced, a pair of lower and upper endless strainers in said tank having adjacent sides traveling in a forward direction, and converging away from the receiving portion of said tank and between and by which the stock is gathered and strained, a pair of expressing rollers carrying the delivery portion of said screens and adapted to assist in compressing said stock evenly and express moisture therefrom, an endless carrier having its upper side supporting the upper side of said lower strainer and assisting in moving the upper side of said lower strainer forwardly and means for actuating said carrier, strainers and rollers at an even advancing surface speed.

5. A felting machine comprising, in combination, a tank into which stock is deliv-

ered, a pair of upper and lower belts having adjacent sides converging to produce a passage of forward diminishing space in which the stock is formed, means for actuating
 5 said belts to advance their adjacent sides and form said stock in said diminishing space, and a carrier belt of open work material having its upper side supporting the upper side of said lower belt, said lower
 10 belt being formed of straining material, and rigid tables supporting the upper and lower sides of said carrier belt.

6. A felting machine, comprising, in combination, a tank into which the stock is delivered, a pair of lower and upper belts having adjacent sides converging to produce a passage of forward diminishing space in which the stock is formed, means for actuating said belts to advance their adjacent sides and form said stock in said diminishing space, and a carrier belt of open work material having its upper side supporting the upper side of said lower belt, said lower belt being formed of straining
 20 material.

7. A felting machine, comprising in combination, a pair of lower and upper belts having adjacent converging sides adapted to move together in a forward direction and
 30 producing a passage of diminishing thickness toward their forward ends, means for actuating said belts to advance their adjacent sides, said belts being composed of straining material, a tank containing said
 35 belts and in which stock is admitted and adapted to flow between them, a pair of pressure rollers at the forward ends of said belts adapted to supplement the pressure by said belts upon the stock at their delivery
 40 ends and said upper belt having its receiving end mounted under downward spring pressure whereby the free end of said upper belt is urged downwardly upon the stock lying between the adjacent sides of
 45 said belts, a carrier belt mounted in said tank and having its upper side supporting the upper side of said lower belt, said carrier belt being constructed of open work material to admit of liquid passing downwardly therethrough and a rigid table supporting the upper side of said carrier belt having passages therethrough for allowing liquid passing downwardly through the upper sides of said belt and carrier and a catch
 50 basin positioned below said table for the water passing downwardly therethrough.

8. A felting machine comprising, in combination, a pair of lower and upper belts having adjacent sides converging to produce a passage in which stock is formed, said belts being composed of straining material, means for actuating said belts to advance their adjacent sides in a forward direction toward their closest ends, a tank into
 65 which the stock is delivered having a re-

ceiving reservoir from which the stock is adapted to flow on the upper surface of said lower belt, a baffle plate disposed within said reservoir and terminating short of the bottom thereof to form with a wall of the
 70 reservoir a way through which said stock is passed to distribute the fibers in the stock evenly, a pair of pressure rollers at the forward ends of said belts adapted to cause the forward end of said belts to exert a maximum pressure upon the stock as it passes forwardly, an agitator in said tank adapted to break up the stock as it enters between said belts, a delivery carrier adapted to receive the stock as it egresses from between
 75 said belts and means for moving a tray below the delivery end of said delivery carrier to place the felted material thereon.

9. A machine of the kind described comprising a tank, a main endless belt strainer having a low receiving point and a high delivery end within said tank, an auxiliary belt strainer, the adjacent faces of said strainers converging toward the delivery end of said main belt, and means for adjusting the degree of convergence of said strainers toward one another.

10. A machine of the kind described comprising a tank, a main endless belt strainer disposed within said tank, and an auxiliary belt strainer pivotally supported at one end above and having its other end urged downwardly under yielding pressure toward said main belt strainer, for the purposes specified.

11. A machine of the kind described comprising a tank, a main endless belt strainer disposed within said tank, and an auxiliary belt strainer having one end urged downwardly under yielding pressure toward said main strainer and its other end supported by means of a vertically adjustable pivot above said main strainer, for the purposes specified.

12. A machine of the kind described comprising a tank, a main endless belt strainer disposed within said tank, an auxiliary belt strainer superimposed above and converging toward said main strainer, and means for agitating stock within said tank and urging it in a downward and forward direction with increasing force between said belts toward the delivery ends thereof, for the purposes specified.

13. A machine of the kind described comprising a tank, an endless belt strainer traveling from a low to a high point within said tank, and means traveling from a high to a low point with respect to said strainer for agitating stock within said tank and urging it downwardly and forwardly toward the high end of said strainer, for the purposes specified.

14. A machine of the kind described comprising a tank, a pair of cooperating endless strainer belts converging toward one an-
 130

other and disposed within said tank, and means for agitating and urging stock within said tank forwardly with increasing force between said belts, for the purposes specified.

15. A machine of the kind described comprising a tank, an inclined endless belt strainer traveling from a low receiving point to a high delivery point, means for feeding stock to be felted directly upon the receiving end of said belt, moisture expressing rollers disposed at the delivery end of said belt, and an endless carrier for receiving and delivering felted stock from said expressing rollers.

16. A machine of the kind described comprising a tank, an inclined endless belt strainer traveling from a low receiving point to a high delivery point, means for feeding stock to be felted upon the receiving end of said belt, moisture expressing rollers disposed at the delivery end of said belt, an endless carrier for receiving and delivering felted stock from said expressing rollers, and a tray supporting carrier disposed and moving below said endless carrier for transporting sheets of felted stock received from said carrier.

17. A machine of the kind described comprising a tank, an inclined endless belt strainer traveling from a low receiving point to a high delivery point, means for feeding stock to be felted upon the receiving

end of said belt, moisture expressing rollers disposed at the delivery end of said belt, an endless carrier for receiving and delivering felted stock from said expressing rollers, a tray supporting carrier disposed and moving below said endless carrier for transporting sheets of felted stock received from said carrier, and mechanism for actuating said endless belt, expressing rollers, endless carrier and tray carrier in synchronism.

18. A machine for felting stock consisting of fibers in fluid suspension comprising, in combination, a strainer belt traveling from a low to a high point, means for holding the stock laterally from flowing over the sides of said belt, progressively increasing pressure means cooperating with said belt for expressing moisture from the stock, and means for receiving the fluid stock and flowing it evenly and directly upon the low end of said belt, whereby an immediate and progressive felting action of the stock takes place from the moment the stock is delivered upon the lower end of the belt and continuously thereafter during its passage toward the high end of said belt.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

CARL G. MUENCH.

Witnesses:

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