May 9, 1961 C. A. M. FOUILLET 2,983,020

CALENDERS

Original Filed July 14, 1955 4 Sheets-Sheet 1

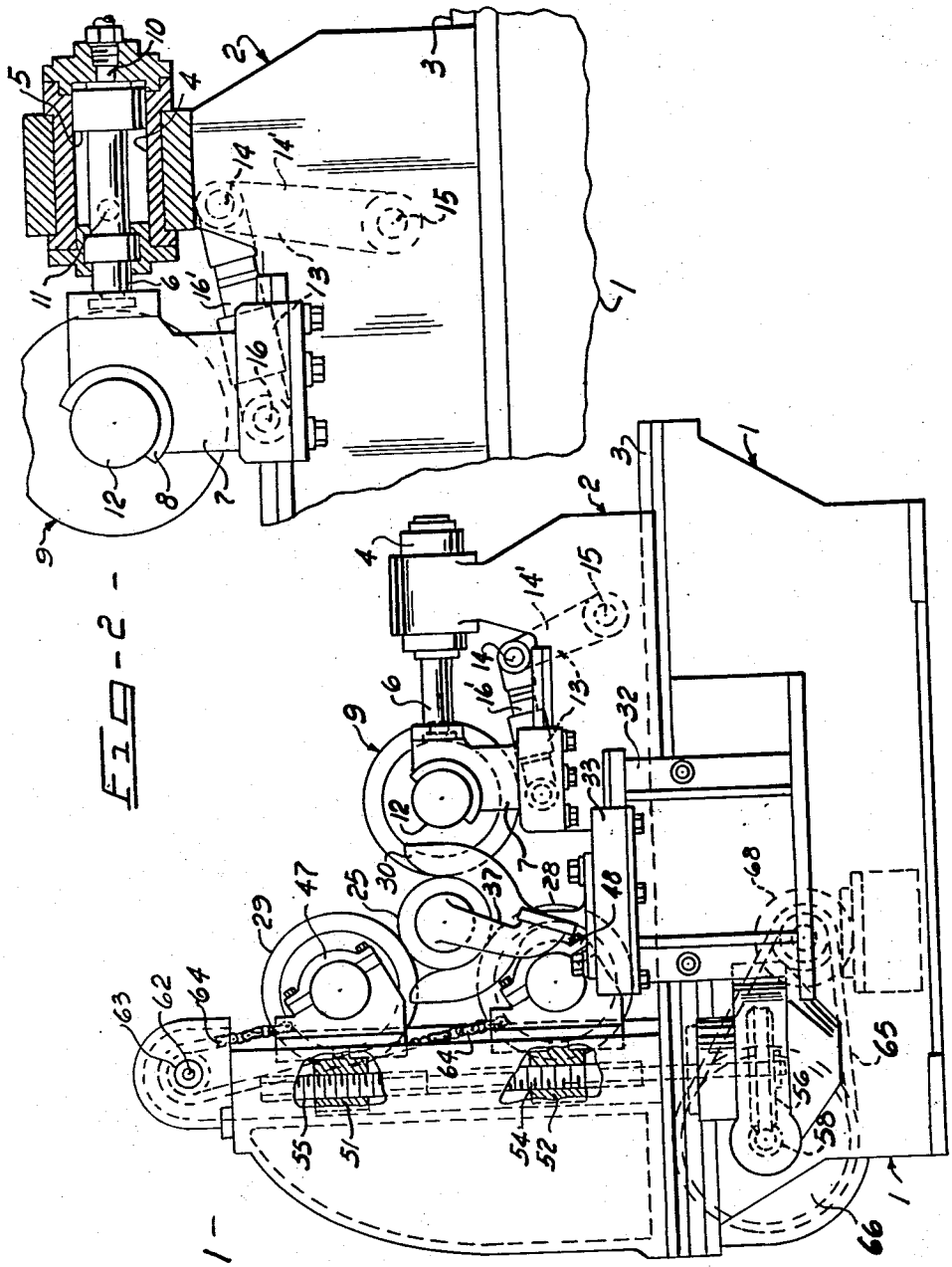

FIG - 2 -

FIG - 1 -

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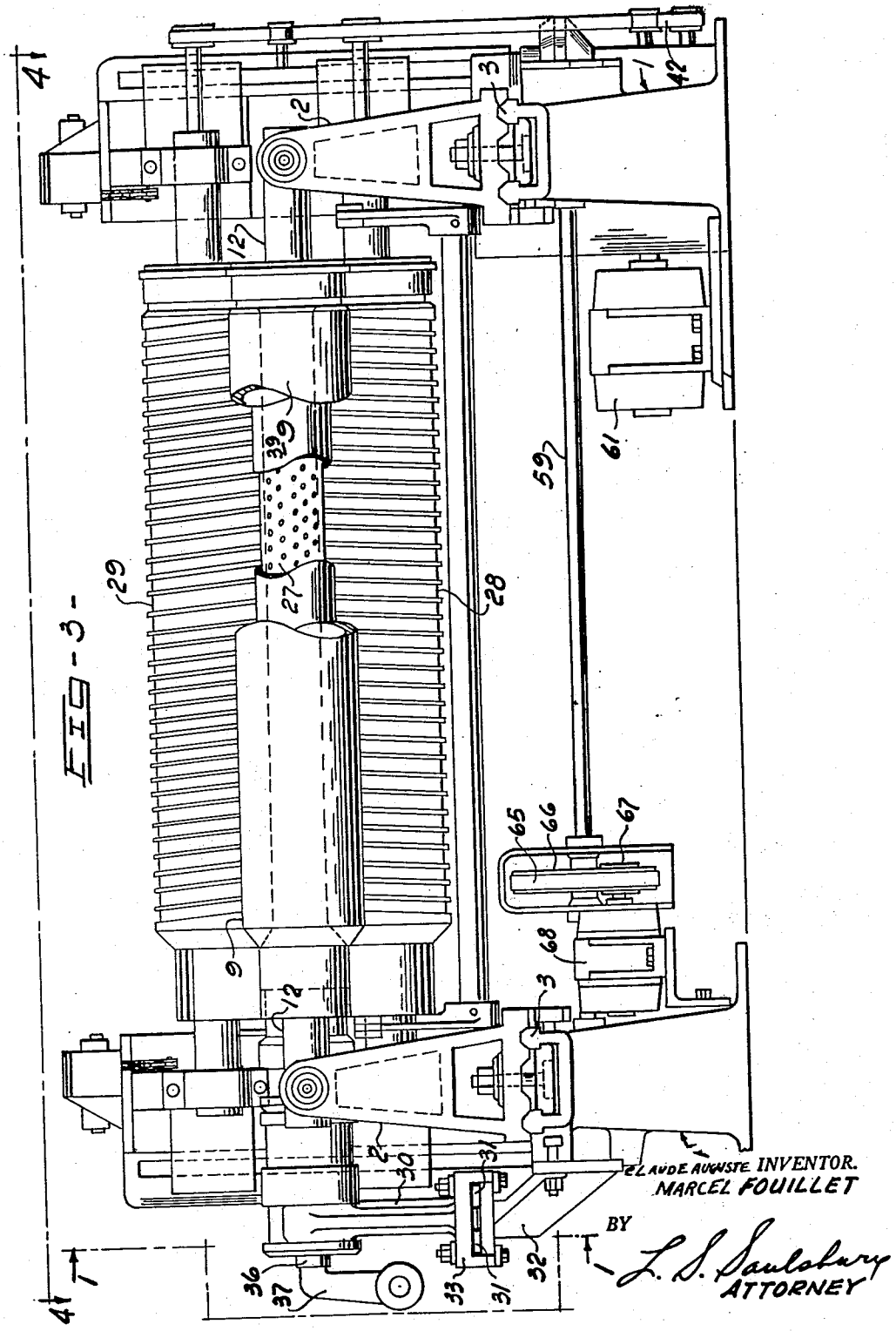
CALENDERS

Original Filed July 14, 1955 4 Sheets-Sheet 2



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Original Filed July 14, 1955 4 Sheets-Sheet 3

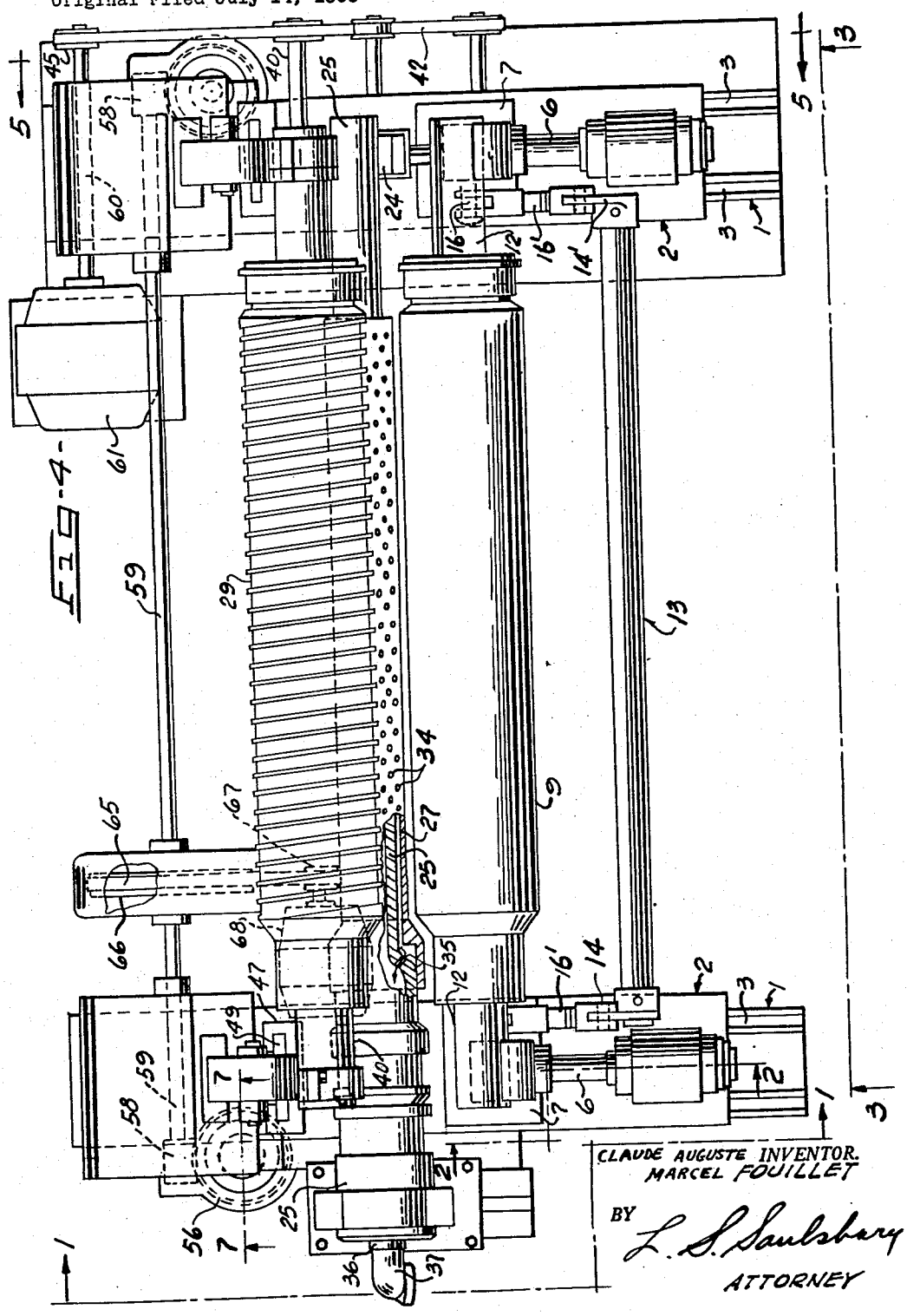

FIG-4-

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CALENDERS

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FIG-6

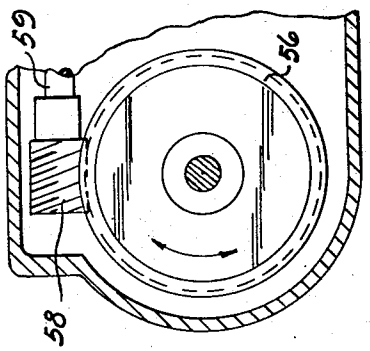


FIG-7

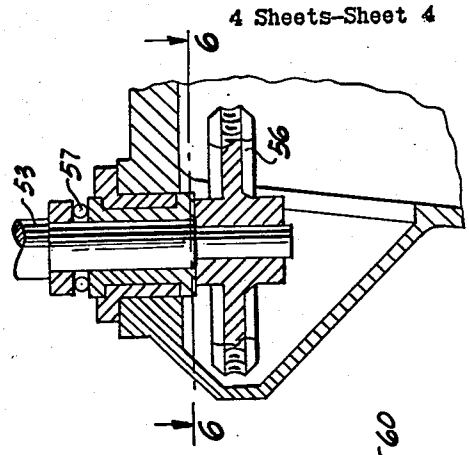
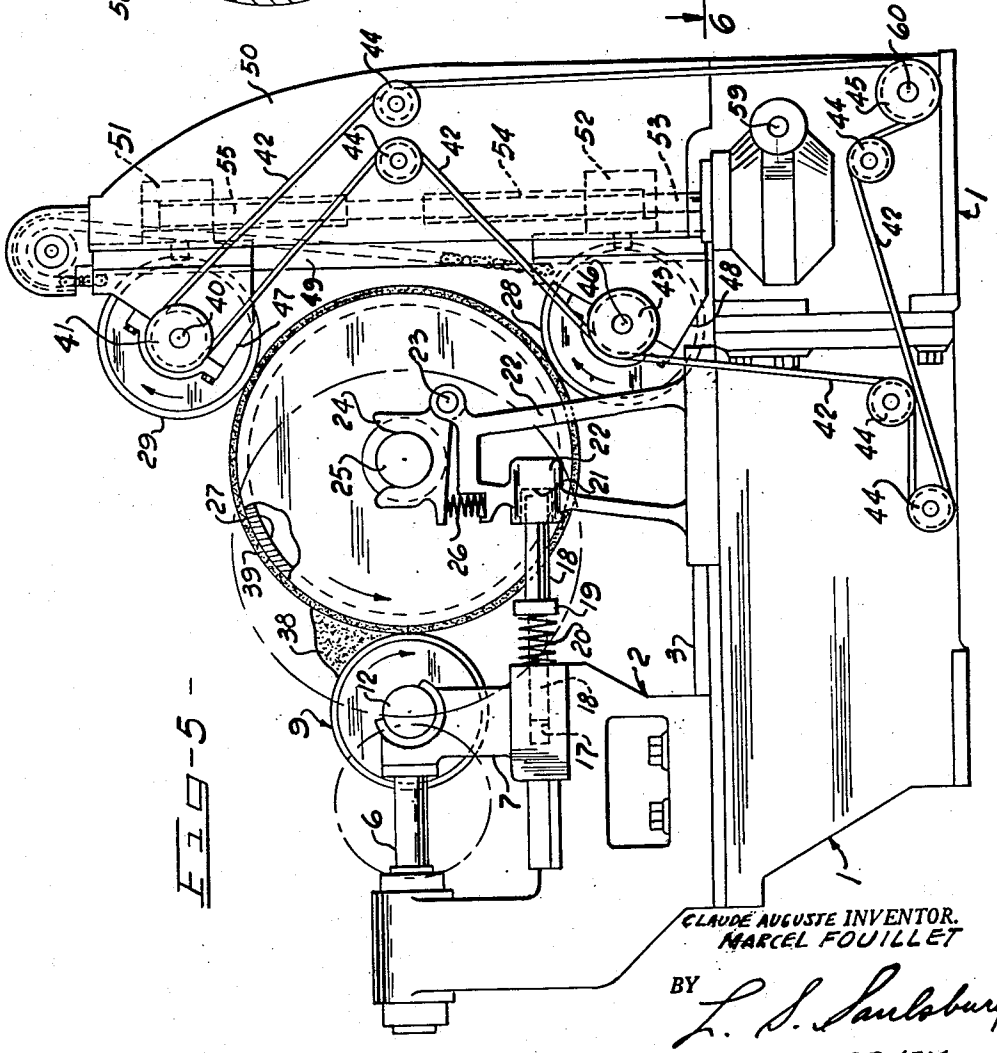


FIG-5



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CALENDERS

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Continuation of application Ser. No. 522,030, July 14, 1955. This application July 18, 1957, Ser. No. 672,749

1 Claim. (Cl. 25—30)

This invention relates to improved mechanical calenders for the manufacture of asbestos-cement coated pipe or the like. This application is a continuation of my co-pending application Serial No. 522,030, filed July 14, 1955, now abandoned.

It is an object of the present invention to provide means for obtaining the highest amount of compression when applying the wet mixture of asbestos-cement during the calendering process and therefore means for obtaining a better exterior finish of calendered pipes.

It is another object of the invention to reduce the time required to manufacture calendered pipes.

It is a further object of the present invention to provide means for maintaining adjustable equidistant parallelism of three rollers disposed 120 degrees from each other at all times.

It is a further object of the present invention to provide hydraulic piston pressure to one of the rollers known as the compression roller and which is a means of effectively forcing out the liquid part of the wet asbestos cement mixture.

It is another object of the present invention to provide damping means to absorb the shock when the compression roller is rammed towards the central cylindrical sleeve upon which a layer of asbestos cement is to be calendered.

It is a further object of the present invention to provide screw and counterbalanced chain means to two rollers known as reaction rollers and thus assure calibrated movement of each reaction roller away or towards each other with respect to a plane equidistant from each roller at all times.

It is a still further object to provide guiding rods at each end of the compression roller to maintain parallel alignment when the roller advances towards the central sleeve upon which a layer of stock is to be calendered to form a pipe.

Another object of the present invention is to provide damping means to the central idler sleeve to any shock from the two reaction rollers and the compression roller and also prevent disequilibrium of pressure from the three rollers.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is an end elevational view taken of the left side end of the pipe calendering machine;

Fig. 2 is a fragmentary vertical cross sectional view taken through one of the two hydraulic cylinders which actuates the compression roller and as viewed on line 2—2 of Fig. 4;

Fig. 3 is a front elevational view of the pipe calendering machine with the compression roller broken away to look upon the pipe being formed;

Fig. 4 is a top plan view of the pipe calendering machine;

Fig. 5 is an end elevational view taken of the right side end of the pipe calendering machine;

Fig. 6 is an enlarged horizontal sectional fragmentary view taken on line 6—6 of Fig. 7;

Fig. 7 is a fragmentary vertical sectional view taken on line 7—7 of Fig. 4.

Referring now to the drawings, a detail description will be made. This pipe calendering machine comprises a bed frame 1 which has bearing blocks or support frames 2 that are adjustably slidable fore and aft atop the respective bed frames 1 and guided by parallel tongue and groove guideways 3 in the surface of frame 2.

Each of the bearing blocks or frames 2 holds a two-way fluid cylinder device 4 in which rides piston 5 which is integral with piston rod 6, Fig. 2. Said piston rod 6 is directly coupled to another slidable frame block 7 which is slidable upon the block or frame 2. Pressurized hydraulic fluid is used to move piston 5 in controlled directions by introducing hydraulic fluid in either ports 10 or 11. Frame 7 supports journal 12 of compression roller 9 in bearing 8 which is integral with the frame 7. The upper frames 7 on either end of compression roller 9 are connected together to work in unison through a laterally extending stabilizer device 13 having a moving pivot 14, a stationary pivot point 15 is journalled in frames 2 and a pivot connection 16 with upper slidable frame 7. The device generally comprises stabilizer shaft 15', end arms 14 and links 16'. The device 13 maintains parallel movement of the frames 7 and the alignment of compression roller 9 with other rollers to be mentioned.

In one frame 7 there is a bored hole 17 into which rod 18 is introduced, Fig. 5. Spring 20 between frame 2 and stop 19 of rod 18 acts to cushion the shock when rods 6 are activated rapidly in a forward direction to move the above-mentioned compression roller 9. The other end of spring loaded rod 18 makes contact with a bored pocket 21 of mandrel supports 22.

The frame 22 is slidable atop the bed frame 1, Fig. 5. Forked journal bearing 24 is pivotally connected by an offset pivot pin connection 23 upon upper end of the frame 22. A spring 26 between forked bearing 24 and slidable frame 22 absorbs any shock or unequal stresses borne by a mandril 25 that carries a perforated work or pipe sleeve 27. The pipe sleeve 27 makes contact with compression roller 9 and reaction rollers 28 and 29. On the lefthand side of the machine, as shown in Fig. 1, mandril 25 is dropped into and supported by forked bearing frame 30. Base 33 of the frame 30 is slidable atop bracket 32 secured to bed frame 1.

Referring to Fig. 4, it will be seen that mandril 25 is hollow except for being plugged at the extreme right end. Mandril 25 is terminated at its extreme left end by an annular airtight swivel joint 36 that is coupled with flanged pipe fitting 37. Fitting 37 is thus kept from revolving about the longitudinal axis of mandril 25 when the mandril 25 is made to revolve during the calendering process. A suction pump, not shown, will be connected to the flanged fitting 37 and serves to draw the excess water from the wet asbestos cement mixture 38 from which asbestos cement pipes are manufactured by a calendering process. The perforated work sleeve 27 may have varying outside diameters to suit the size pipe to be manufactured and is slipped over the hollow mandril 25. Wet asbestos-cement mixture 38 is introduced from above along the bight between compression roller 9 and perforated sleeve 27. As will hereinafter be more fully described, the sleeve 27 and mandril 25 are made to turn about their central longitudinal axes and a layer of cement 38 of desired thickness is formed on the exterior cylindrical surface of work sleeve 27 to form a coated pipe 39. Revolving compression roller 9 under hydraulic pressure firmly presses pipe wall 39

and serves to squeeze out the excess water from the wet cement 38. At the same time, water is sucked from within through perforations 34 of sleeve 27 and through annular passage between the wall of said sleeve 27 and the wall of hollow mandril 25, the suction further continued through apertures 35 in the left end of the mandril, Fig. 4, and into the suction pump connected to the flanged fitting 37. Therefore, means are provided to expedite the time required to manufacture a pipe because of this rapid drying out process.

The reaction rollers 28 and 29 have shallow spiral ribs on their exterior cylindrical surfaces which provide means for compacting the cement 38 upon the pipe 39 while drying of the cement is being done. Revolving rollers 28 and 29 also cause sleeve 27 to revolve which in turn causes roller 9 to revolve. Parallel longitudinal axes of rollers 9, 28 and 29 are always disposed at 120 degree angles from longitudinal axis of sleeve 27 and this relationship is maintained with any size sleeve 27 which is to be coated.

Reaction roller 29 has a journal 40 which is held by journal bearing frame hangers 47, one at each end of the roller and which are vertically adjustable. The journal bearing frames 47 are guided and retained vertically by riser members 49 on either side of the machine, Fig. 5. The roller 29 has a pulley 41 secured to its journal 40 on the right side of the machine.

Reaction roller 28 has a journal 46 which is held by journal bearing frames or hangers 48, one at each end of the roller and which is vertically adjustable. The journal bearing frame 48 is guided and retained vertically by riser member 49 on each side of the machine. The roller 28 has a pulley 43 secured to its journal 46 on the right side of the machine. A system of idler pulleys 44 is also provided on the right side of the machine and belt 42 connects all pulleys for driving the reaction rollers 28 and 29. Driving pulley 45 drives the belt pulley system through driving shaft 60 which in turn is driven by motor 61.

Each of the frames or hangers 47 and 48 have integrally connected, rearwardly extending extensions 51 or 52 having vertically threaded holes therein and they are disposed within rearward supports 50 of the machine and atop bed frames 1, the extension 51 having a right hand threaded hole and extension 52 having a left hand threaded hole. Worm pinion 58 driven by shaft 59 drives horizontally disposed worm wheel gear 56 which in turn drives threaded shaft 53 and thrust bearing 57 is provided between worm gear 56 and the vertically disposed threaded shaft 53, Figs. 5, 6, and 7. Shaft 53 has a right hand threaded portion 55 and a left hand threaded portion 54, mating with the above mentioned extensions 51 and 52. Shaft 59 which drives worm pinion 58 is driven by pulley 66, Figs. 3 and 4, which is made to turn in either direction belt 65 driven by pulley 67 driven by motor 68. Worm pinion 58 driven in one direction causes rollers 28 and 29 to travel away from each other in calibrated fashion and their longitudinal axes will always remain at an angle of 120 degrees to the longitudinal axis of varying size sleeve 27 from which cement coated pipe 39 is fabricated.

The weight of the hangers 47 and 48 are counterbalanced by a chain and sprocket arrangement, Fig. 1. Sprocket 63 carried by shaft 62 on either side of the machine suspends chain 64 from above. The chain 64 is attached to each hanger 47 and 48 and extends therebetween. Vertical movement of hanger 47 in one direction is complemented by equal movement of hanger 48 in the opposite direction, and chain 64 remains taut to effectively carry the weight of each hanger.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claim.

What is claimed is:

An asbestos cement pipe calendering machine comprising a bed frame having laterally spaced parallel guideways, fluid cylinder support frames respectively adjustably fixed to the guideways of the bed frame, mandrel support frames respectively mounted on the bed frame rearwardly of the respective fluid cylindrical support frames for free fore and aft sliding movement, rear supports extending upwardly from the top of the bed frame, vertically spaced reaction rollers carried upon the rear supports, means for driving said rollers, a mandrel adapted to detachably support pipe sleeves to be calendered with asbestos cement, said mandrel supports respectively having journal bearings for supporting the ends of the mandrel, said mandrel bearings being pivotally hinged upon the mandrel supports rearwardly of their bearing axes for pivot up and down movement with respect to the supports, biasing means supporting the forward ends of the mandrel bearings and forwardly of their axes to absorb shock and unequal stress borne by the mandrel, compression roller bearing blocks respectively carried upon the respective fluid cylindrical support frames for fore and aft sliding movement with respect thereto, an idler compression roller forwardly spaced from the rear drive rollers journalled in the roller frame blocks, fluid cylindrical devices respectively carried by their support frames and operable to shift the roller bearing blocks and the compression roller toward or away from the pipe sleeve carried by the mandrel and cushion rod means extending between the compression roller bearing blocks and the mandrel supports to cushion the shock of the compression roller when thrust toward the pipe sleeve and the mandrel by the fluid cylindrical devices and to urge the mandrel supports and the mandrel with the pipe sleeve toward the rear drive rollers.

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