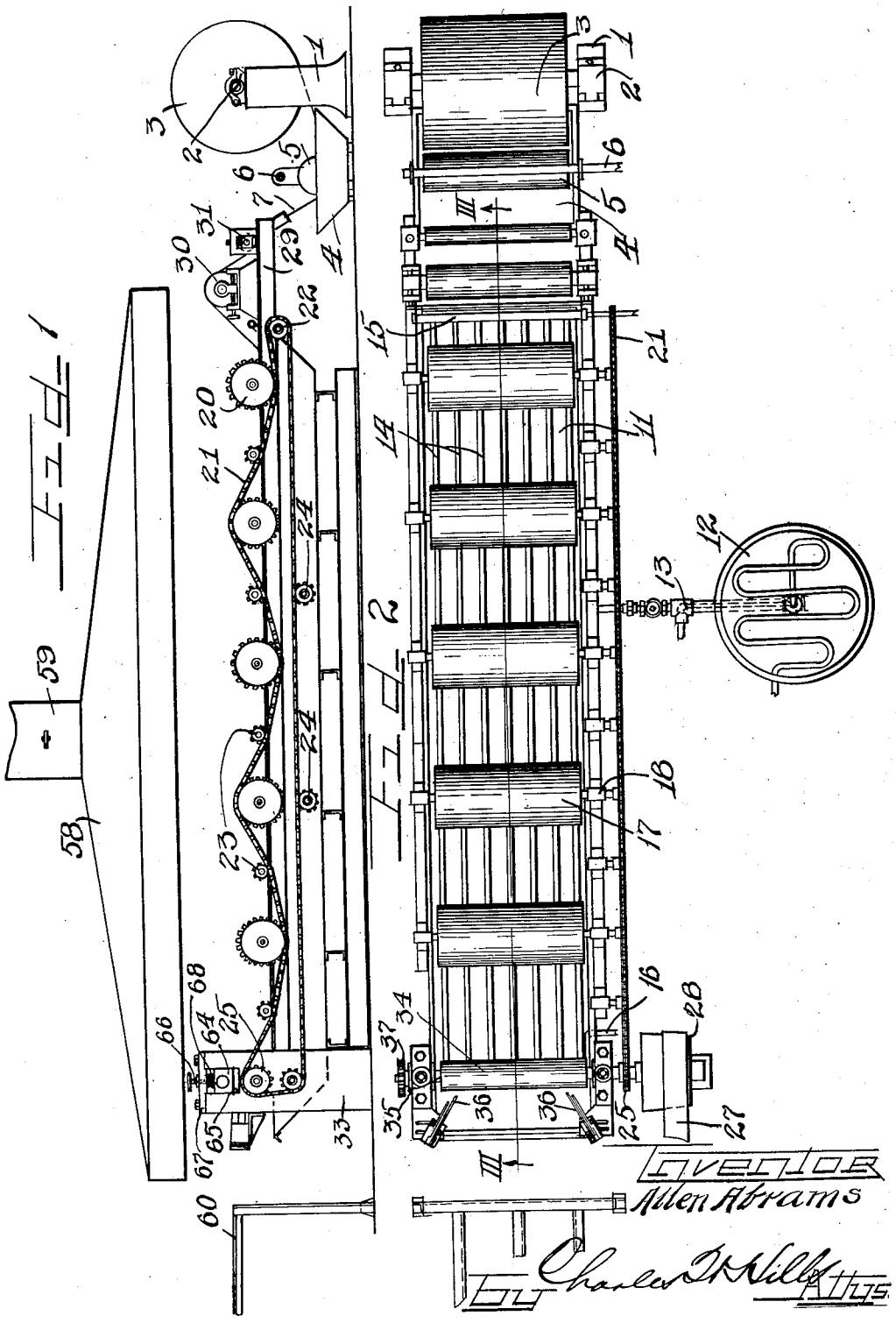
Nov. 1, 1932. A. ABRAMS 1,885,167

MACHINE FOR TREATING PAPER BOARD AND PROCESS

Filed Dec. 19, 1928 2 Sheets-Sheet 1



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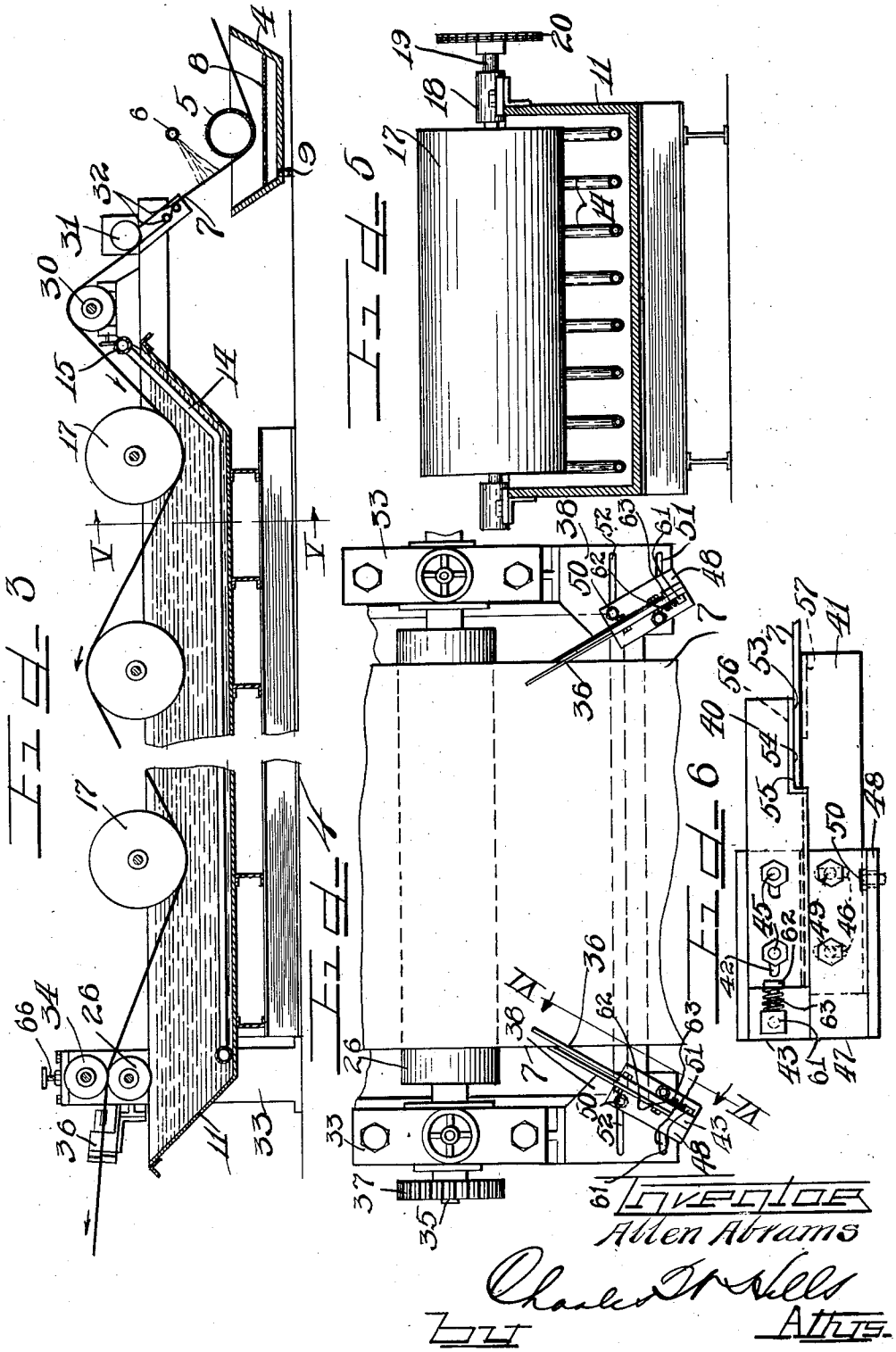

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UNITED STATES PATENT OFFICE

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MACHINE FOR TREATING PAPER BOARD AND PROCESS

Application filed December 19, 1928. Serial No. 326,919.

This invention relates to a machine and process for treating paper board and more particularly for impregnating paper board or other web material with sulphur.

It is an object of this invention to provide a machine and process for impregnating web material, such as fiber or paper board, with sulphur to obtain a uniformly impregnated, waterproof article.

Other and further important objects of this invention will become apparent from the disclosures in the specification and the accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a side elevational view of an apparatus embodying the principles of my invention, showing the driving mechanism;

Figure 2 is a top plan view of the apparatus;

Figure 3 is an enlarged broken sectional view taken substantially on line III—III of Fig. 2;

Figure 4 is an enlarged fragmentary top plan view of a portion of the apparatus showing the doctor devices;

Figure 5 is a sectional view taken substantially on line V—V of Fig. 3; and

Figure 6 is an enlarged elevational view taken substantially on line VI—VI of Fig. 4.

The reference numeral 1 indicates a supporting stand provided with split bearings 2 for rotatably supporting a reel 3 of web material, such as paper board. A pan or trough 4, having mounted therein a perforated roll 5 is positioned adjacent to the supporting stand 1. A shower pipe 6 is mounted above the pan 4 for directing a spray of water or steam against the web of material 7, which passes from the reel 3 under the perforated roll 5. In order to prevent the formation of a pool of water within the pan 4, said pan is provided with a false perforated bottom 8 and a drain pipe 9.

A vat 11, comprising a relatively shallow tank, is provided for containing molten sulphur. Additional sulphur is run into the vat 11, as required, from a melting tank 12 positioned at one side of the tank 11 and connected thereto by means of a valve controlled pipe 13 heated internally by a steam pipe concentric therewith. The vat 11 is provided with a plurality of steam lines 14 for melting the sulphur and keeping it at the desired temperature. Said steam lines 14 extend longitudinally of the vat and are inclined upwardly at one end for connection to a steam header 15, said lines being connected at the other end to a drain pipe 16.

A plurality of rolls 17 are mounted transversely of the vat 11 in bearings 18 supported from the side walls of said vat 11. On the drive side of the vat 11, the journals of said rolls 17 are extended through the bearings 18 to provide extensions 19 (Fig. 5) on which are mounted sprocket gears 20. A chain 21 cooperates with the sprocket gears 20 and at one end passes around a take-up sprocket gear 22 capable of longitudinal adjustment. Idler sprockets 23 are positioned between adjacent sprocket gears 20 for depressing the upper run of the chain 21 and other idler sprocket gears 24 are arranged for supporting the lower return run of the chain 21. Said chain 21 is adapted to be driven through a sprocket gear 25 positioned on the extended end of a lower squeeze roll 26 by means of a belt 27 or other suitable driving means, including a cone pulley 28.

As illustrated in Figure 1, alternate rolls 17 are adapted to be driven in the same direction with the web 7 passing alternately under and over the consecutive rolls as shown in Fig. 3. It will be apparent, however, that the chain 21 can be trained around the sprocket gears 20 and idler sprocket gears 23 in such a manner as to permit the web 7 to travel below the rolls 17 for its entire passage through the vat 11 or beneath any number of said rolls and above other of said rolls. In this manner the period of submersion of the web 7 beneath the surface of the molten sulphur may be varied at will.

At the end of the vat 11 adjacent the reel stand 1, there are provided side extension frame members 29 from which is mounted an adjustable guide roll 30 for guiding the web 7, a spring tension roll 31 for tensioning the

web 7 and a pair of doctor rolls 32 between which the web 7 is adapted to be passed.

At the other end of the vat 11 is positioned a pair of pedestals 33 for supporting the lower squeeze roll 26 and an upper squeeze roll 34. Said upper squeeze roll is journalled in bearing blocks 64 slidably mounted in guideways 65 formed in the pedestals 33. The desired pressure between the two squeeze rolls is obtained by means of manually operable tightening bolts 66 threaded through yokes 67 and coiled springs 68 associated therewith and adapted to bear against said bearing blocks 64. The use of the coiled spring tighteners serves to effect the desired compression between the squeeze rolls 26 and 34, with sufficient flexibility in operation to compensate for any slight inequalities in the caliper of the paper board, thereby permitting of an absolutely clean surface on the board as it leaves the machine.

Said squeeze rolls 26 and 34 are adapted to be heated to prevent an accumulation of sulphur upon their surfaces and for this purpose are connected to steam lines 35 passing through their hollow extended journals. Spur gears 37 are mounted upon said respective journals in intermeshing relation.

A pair of doctor devices, indicated as a whole by the reference numeral 36, are also adapted to be mounted from the pedestals 33, as by means of brackets 38. Each of said devices 36 comprises an upper doctor plate 40 and a lower doctor plate 41 adjustably mounted upon a holder 48. The upper plate 40 is adapted to be secured through horizontal elongated slots 42 to the upper portion of a vertical flange 43 of the holder 48 by means of bolts 45 (Figure 6). The lower plate 41 is likewise secured through vertically elongated slots 46 to the lower vertical flange portion 47 of the holder 48 by means of bolts 49. The doctor holders 48 are adjustably secured to the brackets 38 by pins 50 extending through elongated transverse slots 51 and 52 in said brackets 38. Each of said doctor devices 36 is therefore adjustable as a whole in the slots 51 and 52 transversely of the web 7.

In order to compensate for any slight weaving of the web 7 in passing between the doctor devices, coiled springs 63 or the like are arranged under slight compression between lugs 61 and 62 on the vertical web 43 and the outer end of the upper doctor blade 40, respectively, to press the doctor blades inwardly into contact with the edges of the web 7.

Each of the upper plates 40 of the doctor device is provided along its lower edge with a rectangular recess 53 forming edges 54 and 55, beveled as at 56, for contact with the upper side and edge of the web, respectively. Each of the lower plates 41 is provided with an upper straight edge, beveled as at 57 for a short distance from the end of said plate for contact with the under side of the web 7.

As best shown in Fig. 6, each outer edge of the web 7 scrapes against the short, vertical, beveled edge 55 of the upper plate 40 and the upper surface of the web 7 for a short distance in from its edge scrapes against the beveled lower edge 54 of said upper plate 40. The doctor devices thus serve to remove any excess quantities of sulphur upon the edge of the web 7 or adjacent thereto. The doctor devices, furthermore, are set at an acute angle to the line of travel of the web 7 so as to aid in deflecting the excess quantities of sulphur off the edge of the web. If desired, the doctor blades 40 and 41 may be heated to prevent solidification of the sulphur thereon. The relative adjustment between the blades 40 and 41 provided by the elongated slots 46 permits accommodation of the doctor devices to any thickness of web material. The adjustment can be made by loosening the nuts on the bolts 49 and moving the lower doctor blades 41 toward or away from the upper blades 40.

A hood 58 is preferably constructed above the vat 11, provided with a damper controlled stack 59 through which a forced draft may be supplied by any suitable means to draw off fumes rising from the molten sulphur.

The sulphur impregnated web 7 after leaving the squeeze rolls 26 and 34 and the doctor devices 36, passes on to a platform 60, from which the web may be delivered to a cutter of any standard type to cut the web into sheets.

The operation of my apparatus is as follows:

A reel of web material to be impregnated is mounted upon the unreeling stand 1 and the end of the web threaded beneath the perforated roll 5, through the doctor rolls 32, and beneath the tension roll 31 over the guide roll 30.

It has been found that paper board or other fibrous material is sometimes difficult to impregnate satisfactorily with the sulphur, but that this difficulty can often be overcome if the paper board be moistened somewhat. Accordingly it may be necessary to moisten the web material, as by means of a water spray from the shower pipe 6. The perforated bottom 8 of the trough 4, together with the drain pipe 9, prevents the accumulation of a pond of water in case the web 7 should break or become slack and thus eliminates the difficulty that would arise were the web 7 to fall into a pool of water.

After passing over the guide roll 30, the web 7 may be passed alternately under and over successive rolls 17 in the tank 11 of molten sulphur. The sulphur is preferably kept at a temperature of between 270 and 300° F., within which range the sulphur has been found to possess the desired degree of viscosity. As previously explained, the drive

for the rolls 17 is so arranged as to permit the web 7 to be immersed in the molten sulphur bath throughout its entire passage through the vat 11 or for only a part of its passage. It has been found, however, that paper board can be most satisfactorily impregnated with sulphur if the paper board or the like is alternately exposed to the atmosphere and the bath.

In passing between the squeeze rolls 26 and 34, which are heated, the excess quantities of sulphur picked up by the web 7 are squeezed out of the web and a smooth surface formed thereon. The doctor devices 36 remove any excess quantities of sulphur that may still remain on or near the edge of the web after passing through the squeeze rolls. The sulphur in the web will obviously harden rapidly after leaving the squeeze rolls and will be perfectly set before reaching the cutters.

The final product made by the process above described is a dense, water-proof sheet having a hard finish. The percentage of sulphur in the impregnated paper board can be varied through a wide range.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. An apparatus for impregnating fibrous web material, comprising a support for a reel of fibrous web material, a device for moistening the web material, a vat for containing molten sulphur, a plurality of rolls associated with said vat and adapted to be partially immersed in said molten sulphur for guiding the web material into and out of said molten sulphur, a pair of heated squeeze rolls, one of said rolls being driven to draw the web material therebetween and remove the excess quantities of sulphur, and doctor blades arranged for scraping the edges of said web material.

2. In the process of impregnating web material with sulphur, the steps of moistening the web material and alternately immersing the web material in molten sulphur and exposing the treated web material to the atmosphere.

3. A process for impregnating web material which comprises first moistening the web with water and then passing said moistened web through molten sulphur.

4. A process for impregnating web material which comprises first moistening the web with water and then alternately passing said moistened web through molten sulphur and exposing the web to the atmosphere.

5. A process for impregnating web material which comprises first moistening the web with water and then alternately passing said moistened web through molten sulphur and exposing the web to the atmosphere and removing the excess sulphur from the sides and edges of said web.

In testimony whereof I have hereunto subscribed my name at Rothschild, Marathon County, Wisconsin.

ALLEN ABRAMS.