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PLASTIC STOCK MANIPULATING APPARATUS

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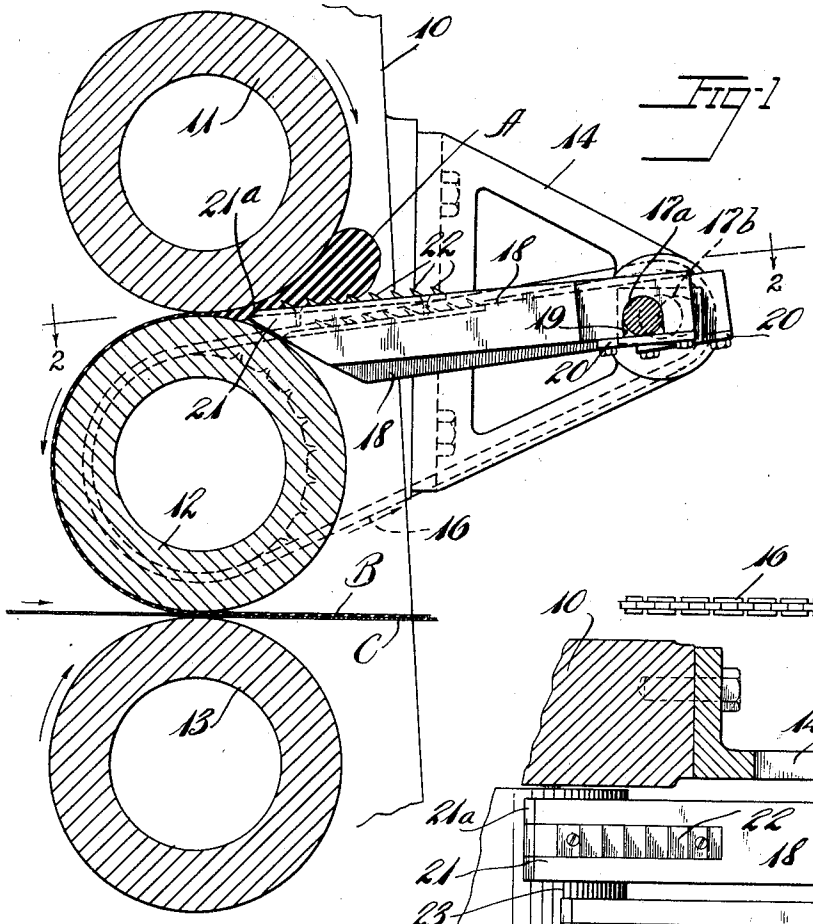


Fig-1

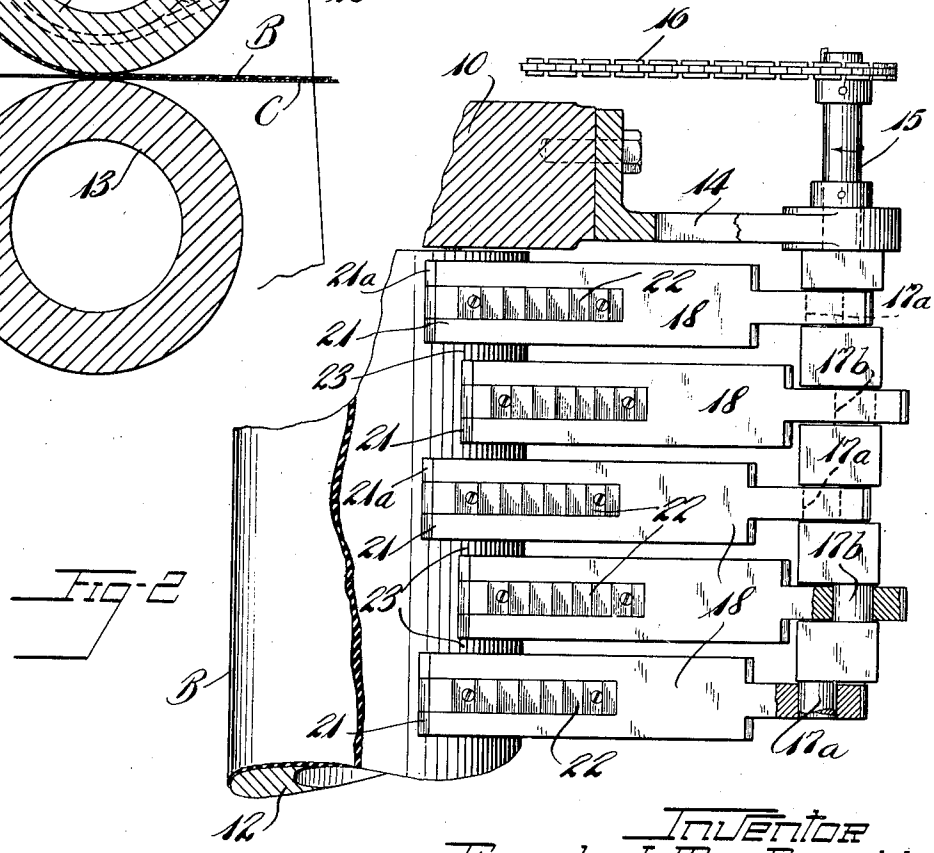


Fig-2

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PLASTIC STOCK MANIPULATING APPARATUS

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13 Claims. (Cl. 18—2)

This invention relates to apparatus for manipulating plastic stock, such as unvulcanized rubber composition, and has particular application to the feeding of rubber stock into the bight of the rolls of a calender, mill or the like, and especially to the feeding of stock of such composition that it possesses insufficient cohesion to be drawn evenly between the rolls from a mass of the stock banked in the bight of the rolls without the application of feeding pressure to the stock from behind.

In the prior practice it has been common to prod the stock manually into the bight of the rolls, this procedure having the disadvantage of being dependent upon the skill and diligence of the operator for uniformity of feed, with the likelihood of injury to the operator's hands, and it has been difficult to avoid entirely the formation of objectionable thin spots or other malformations in the rolled stock resulting from unevenness in the feed.

Chief among the objects of the invention are to provide compact and efficient apparatus for feeding the stock into the bight of the rolls with substantial uniformity in the rate of feed, with the application of substantially uniform feeding pressure along the bight, and with safety to the operator.

These and further objects will be apparent from the following description, reference being had to the accompanying drawing in which:

Fig. 1 is a vertical section of apparatus embodying the invention, parts being broken away.

Fig. 2 is a section taken on the line 2—2 of Fig. 1, parts being broken away.

In the embodiment illustrated in the drawing the invention is shown in a preferred form as applied to a calender for forming rubber stock, indicated at A, into a sheet B, and for applying the sheeted stock onto a fabric backing C. The calender itself, which is of common construction, comprises a pair of side frames, one of which is shown at 10, and cooperating rolls 11, 12 and 13 rotatable on horizontal axes between the side frames. The stock is introduced by banking the same in the bight of the rolls 11 and 12, as shown, and the calendered sheet is fed around the semi-circumference of roll 12 and is pressed onto the fabric backing between rolls 12 and 13 in a manner well understood in the art.

Secured to the side frames of the calender is a pair of brackets, one of which is shown at 14, and in these brackets is journalled a crank shaft 15 for rotation on an axis spaced from and parallel to the axes of the calender rolls. The crank shaft is driven by any suitable means, such as the sprocket chain 16 connecting a sprocket secured to the crank shaft with a sprocket rotatable with the calender roll 12.

The crank shaft is provided with two sets of cranks, the cranks 17*a*, 17*a* of one set being in axial alignment with each other and being arranged in alternation longitudinally of the shaft with the cranks 17*b*, 17*b* of the other set which likewise are aligned with each other. The two sets of cranks are arranged angularly of each other, preferably at 180°, for a purpose to be explained presently.

A plurality of reciprocable members 18, 18 of identical construction are journalled at their rear ends on the cranks 17*a*, 17*b*, each preferably by means of an open slot 19 in the pusher member capped by a plate 20 for ready detachability. Each pusher member is formed at its forward end with a forwardly tapered stock-engaging nose 21 which at its leading edge is laterally broad and is preferably somewhat blunt as shown in 21*a* to afford a surface engageable with the bottom of the bank of stock to press this portion of the stock forwardly toward the bight of the rolls as the pusher member is advanced. The arrangement is such that in the extreme advanced position of the pusher member its nose is sufficiently spaced from the bight and from the surface of the upper roll 11 to permit ample flow of the stock and continuity thereof above and in advance of the nose for efficient calendering. The sloping bottom surface of the nose of each pusher member rests against and slides to a limited extent circumferentially over the curved surface of the calender roll 12 during reciprocation of the member, thereby causing a rising and descending movement to be imparted to the forward end of the member as it is reciprocated. A plurality of upwardly projecting and forwardly inclined stock-engaging teeth 22, 22 are provided on the upper forward portion of each member, these teeth, by their forward inclination, being adapted to press the stock forward during advance of the reciprocable pusher member and to be released from the stock during the rearward movement of the member.

It is not essential in all cases that the noses of the pusher members be positioned very close together along the roll, as in the case of stocks of sufficient cohesion the crowding of the stock into the bight of the rolls by each member causes a feeding pressure which is not limited in extent to the breadth of the member and for most rubber stocks a generous gap is permitted between the noses of adjacent members, as indicated at 23, 23 in Fig. 2, without detrimentally affecting the uniformity of thickness of the calendered stock.

In operation, the crankshaft 15 is rotated in the direction of the arrow in Fig. 2 causing the pusher members 18 to be reciprocated toward and away from the bight of the rolls. During its advancing stroke, each member is caused by the upward throw of the crank at its rear end and by the sliding of the nose of the member upwardly

on the curved surface of the roll 12 to be bodily raised into engagement of its nose 21, its upper surface, and its teeth 22 with the stock, as the member is advanced, to press the stock into the bight. Preferably the arrangement is such that the upper surface of the member slopes downwardly somewhat toward the bight of the rolls to facilitate, by the acuteness of the angle between the member and the surface of the upper roll 11, the crowding of the stock into the bight.

During its return stroke, each member is caused to drop somewhat, while it retracts, due to the downward throw of the crank at its rear end and to the sliding of the nose downwardly over the curved surface of the roll, and the stock is temporarily freed from the nose, upper surface, and teeth of the member. Owing to the 180° disposition of the two sets of cranks, and their alternate arrangement, the pusher members of the two sets are caused to reciprocate in alternation and thereby to assist one another in becoming freed from the stock during their rearward and downward movement of retraction. While each member retracts, the member next adjacent thereto is advancing and rising to push the stock toward the rolls and thus away from the adjacent retracting member, the cohesion of the stock, as in the case of most rubber stocks, being sufficient to transmit the feeding pressure of the advancing member laterally to a sufficient extent to restrain the stock opposite the adjacent retracting member from being pulled backward objectionably.

While it has been found that some rubber stocks possess sufficient cohesion to cause the stock to be drawn evenly into sheet form from a bank of the stock placed in the bight of the rolls without the necessity of much prodding of the stock from behind, yet many stocks, particularly those heavily laden with pigments, fibrous material and the like, do not possess this characteristic to a degree requisite for even drawing and require repeated prodding from behind, and it will be seen that the invention is particularly useful in connection with the calendering of such stocks.

Variations may be made without departing from the scope of the invention as it is defined in the following claims.

I claim:

1. Apparatus for manipulating plastic stock comprising a pair of stock rolling elements and means for feeding stock into the bight between said elements comprising a stock engaging and supporting member mounted for reciprocation toward and away from said bight.

2. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements and means for feeding stock into the bight between said elements comprising a stock engaging member and means for moving said member in contact of its leading end portion with one of the elements toward and away from the bight of said elements.

3. Apparatus for manipulating plastic stock comprising a pair of opposed stock manipulating elements and means for feeding stock into the bight between said elements comprising a member mounted for reciprocation toward and away from the bight of said elements and having a tapered stock engaging nose.

4. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements and means for feeding stock into the bight between said elements comprising a pair of stock engaging members in contact of their leading end portions with one of said elements, and means for reciprocating said members in alternation toward and away from the bight of said elements.

5. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements and means for feeding stock into the bight between said elements comprising a stock engaging member and means for reciprocating said member toward and away from said bight and for imparting a transverse movement to the member.

6. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements, one of which has a cylindrical surface, and means for feeding stock into the bight between said elements comprising a stock engaging member resting against said cylindrical surface and means for reciprocating said member toward and away from the bight of said elements in sliding engagement with said surface.

7. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements and means for feeding stock into the bight between said elements comprising a member having at its forward end a stock engaging portion in contact with one of said elements and means rearward of said portion for reciprocating said member in a direction toward and away from the bight of said elements while oscillating the rearward portion of the member transversely thereof.

8. Apparatus for manipulating plastic stock comprising a pair of opposed stock rolling elements, one of which has a cylindrical surface, means for feeding stock into the bight between said elements comprising a stock engaging member having a portion resting against said cylindrical surface, and means comprising a crank for reciprocating the member toward and away from the bight of said elements in sliding engagement with said surface.

9. Apparatus for manipulating plastic stock comprising upper and lower stock rolling elements and means for feeding stock into the bight between said elements comprising a pair of stock engaging members and means for advancing and elevating one of said members toward the bight of said elements and for imparting at the same time a retracting and descending movement to the other member away from said bight.

10. Apparatus as defined in claim 9 in which the means for moving the stock engaging members comprises a pair of cranks engaging the same.

11. Apparatus as defined in claim 10 in which the stock engaging members are provided at their upper surfaces with forwardly inclined stock engaging teeth.

12. Apparatus as defined in claim 10 in which the advancing stock engaging member is adapted to present a stock engaging surface sloping downwardly toward the bight of the rolls.

13. Apparatus for manipulating plastic stock comprising upper and lower cylindrical rolls and means for feeding stock into the bight between said rolls comprising a pair of stock engaging members each resting against the cylindrical surface of the lower roll and means comprising a pair of angularly disposed cranks engaging said members for reciprocating the same in alternation toward and away from the bight of said elements in sliding engagement with said lower roll.

FRANK J. MACDONALD.

CERTIFICATE OF CORRECTION.

Patent No. 1,924,210. August 29, 1933.

FRANK J. MacDONALD.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, lines 129 and 133, claims 11 and 12, respectively, for the claim number "10" read 9; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of December, A. D. 1933.

Richard Spencer

(Seal) Acting Commissioner of Patents.