

July 8, 1924.

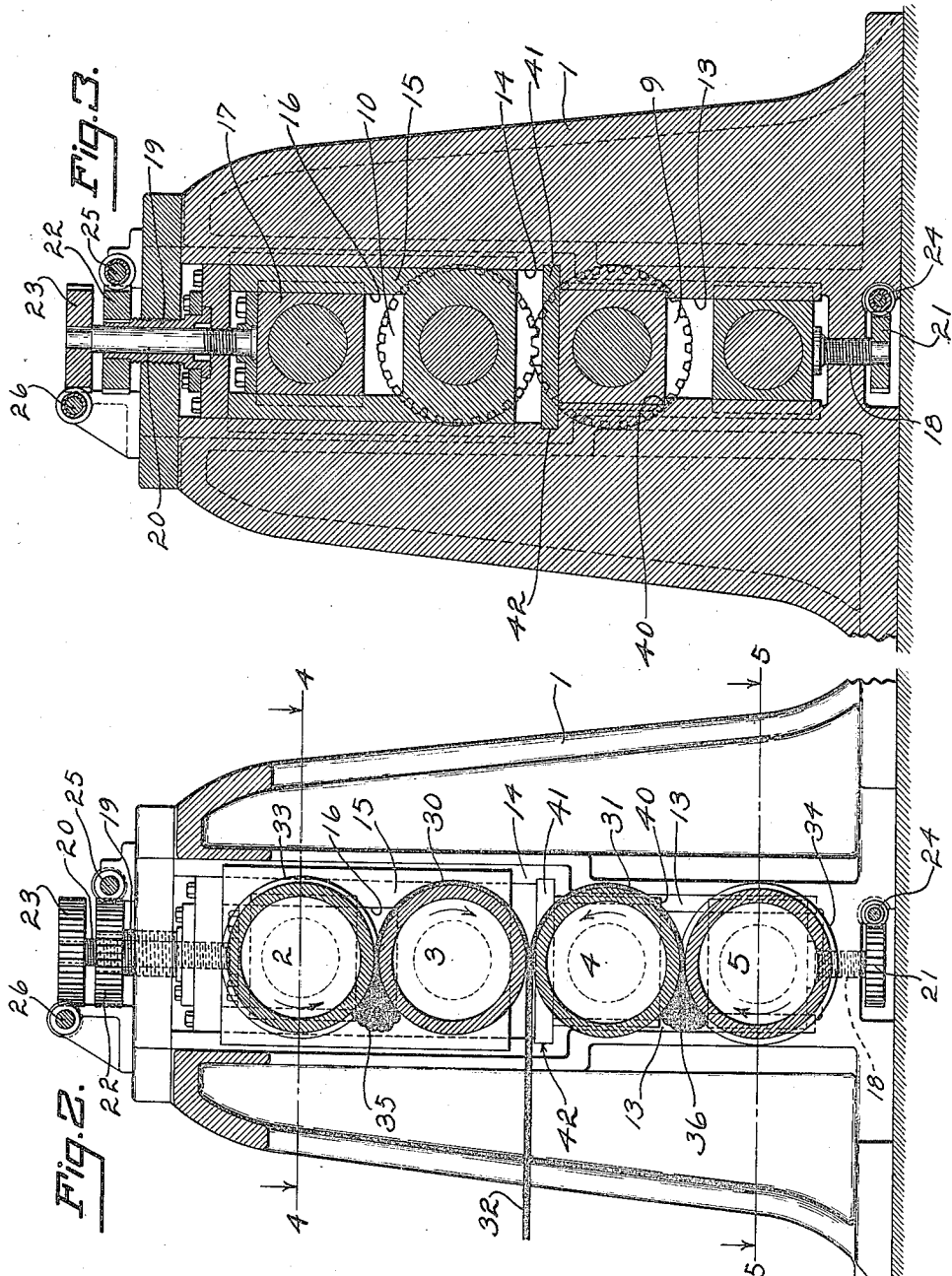
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1,500,679

CALENDER

Filed July 29, 1921

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CALENDER.

Application filed July 29, 1921. Serial No. 488,263.

To all whom it may concern:

Be it known that I, THOMAS MIDGLEY, a citizen of the United States of America, residing at Hampden, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Calenders, of which the following is a specification.

The present invention is an improvement in calender construction.

In the drawings used for illustration:

Fig. 1 is a face view partly in section and with parts broken away;

Fig. 2 is a section on line 2—2, Fig. 1;

Fig. 3 is a section on line 3—3, Fig. 1;

Fig. 4 is a section on line 4—4, Fig. 2;

Fig. 5 is a section on line 5—5, Fig. 2;

and

Fig. 6 is a detail view of coacting roll construction.

The calender parts are carried by the frame 1. Rolls 2, 3, 4 and 5 are arranged to rotate in the frame. Power is applied to the rolls through the gears 6 to 12 connected as in the illustration of Fig. 1. The gears shown in mesh are constructed to remain in mesh and still permit a considerable degree of adjustment of the rolls.

The bearing blocks for rolls 4 and 5 are carried in the guides 13. Guides 14 spaced further apart than the guides 13 serve to receive the bearing blocks 15 of roll 3. These bearing blocks 15 have guides 16 to receive the bearing blocks 17 for roll 2.

Upon the assembly of the rolls in frame 1 the bearings of roll 5 received in guides 13, rest on the top of posts 18 threaded in the frame. The bearings for roll 4 rest upon shoulders 40 in guides 13, and are held in place by bolts or by slides 41 slipped into grooves 42 in the frame. Bearing blocks 15 of roll 3 are held in guides 14 and in turn hold bearing blocks 17 of roll 2 in the guides 16. The construction at each side of the calender is the same. I believe the character of the structure described for holding the calender rolls in the frame is new.

To move the rolls 2, 3 and 5 in desired ways I move their bearing blocks in the guides 13, 14 and 16. The blocks of roll 5 are moved by turning the posts 18. The blocks or supplemental frames 15 of roll 3 are used in addition to carry blocks 17 of roll 2 for these two rolls to move together.

They are moved by turning frame supports or hollow posts 19 which are threaded to frame 1 with a rotatable attachment for each to the top of the blocks 15 as illustrated in Fig. 3. The blocks 17 of roll 2 are moved in addition by turning the frame supports or posts 20, which turn loosely in the bore of posts 19, and have a threaded engagement with the top plate of blocks 15 and a rotatable attachment to the tops of blocks 17 as illustrated. The construction on each side of the machine is the same and each is illustrated by Fig. 3. This character of the structural arrangement to move the calender rolls so far as I am aware is broadly new.

As a means to turn posts 18, 19 and 20 I provide worm wheels 21, 22 and 23 respectively on the end of the posts. As I have described the apparatus the construction on each side of the calender is the same. To insure equal movement in turning the respective pairs of posts 18, 19 and 20 I turn their worm wheels by corresponding pairs of worm gears one pair keyed to each of the cross shafts 24, 25 and 26 rotatable in bearings on frame 1 as illustrated in Figs. 1, 2 and 3. The worms and worm wheels are so constructed that each worm wheel can have a slight vertical motion without coming out of mesh with its worm. The cross shafts 24, 25 and 26 are turned from one side of the calender by hand wheels 27, 28 and 29, which operate through bevel gear connections all of which may be mounted as illustrated in Fig. 1. The bringing together at one station of the controlling means for the relative positions of all four rolls of the calender particularly where such a machine is of the usual large construction gives an improved control over the operation of the calender which I do not believe has been attained before my invention.

Calenders of the general type in which the preceding novel construction is found useful are adapted among other uses for calendering or sheeting rubber stock. This use is indicated in Fig. 2 where sheet 30 is formed between rolls 2 and 3 while a second sheet 31 is formed between rolls 4 and 5. The two sheets are joined together as sheet 32 between rolls 4 and 5. To form sheets 30 and 31 or only one of them with a predetermined width I have provided a novel

structure. In the calender chosen for illustration I have also shown enlarged heads 33 and 34 on the upper and lower rolls 2 and 5 respectively while rolls 3 and 4 may be of usual construction. Instead of integral heads I plan to use in practice adjustable flanges with which to form the heads. The heads or flanges on each of these rolls closely overlap the ends of the adjacent roll. By constructing the flanges or their attachment adjustable (as by frictional engagement) to the rolls I may take up for wear or other reasons. Either bank of rubber 35 or 36 is sheeted out by the rotation of the rolls and the sheet is worked out towards the ends of the rolls. The enlarged heads described and illustrated will either stop the formation of the sheet at the lines marked out by the width of the roll 3 or 4, or will so restrict its formation outside of such lines as to be readily separated. In case any rubber extends beyond the width marked out it cannot in any event get on the main sheet formation of fixed width. The rubber which tends to form in the sheet outside the lines marked out by the enlarged heads is held back in the bank of rubber by the substantially closed corner formed between the enlarged heads and the roll taking the sheet. As rubber cannot leave the bank at such a corner (except under great resistance and then only in the form of a thin film which is forced off the working surface of the roll) it works back along the working face of the roll where it can leave the bank and enter the sheet. The action at the corner is indicated generally by Fig. 6. If desired, however, these flanges may be omitted and control of the width of the sheet secured by the usual guides employed for this purpose.

The meaning of the invention is simple and perhaps entirely clear after the detailed description but is here briefly condensed. The calender rolls are assembled or taken out of the frame with the aid of improved facilities. The rolls are capable of ready adjustment with relation to their respective bights. The rolls may be adjusted by power multiplying devices conveniently accessible. The power multiplying devices may be operated in pairs to move one or two rolls at one time for the individual adjustment between the working faces of adjacent rolls. The control of the power multiplying devices is brought to a single station for the operator. All the adjustments can be made as the machine operates and be immediately checked by the product. The dimensions of a product such as sheet 32 can be adjusted and kept uniform over a long operating period. A four roll calender constructed generally according to my invention can be operated with equal and even better facility as compared to a three roll calender.

I have described a new and useful struc-

ture but not all its possible advantages and uses. Upon the disclosure made I desire to claim the invention as broadly as the law permits as well as certain of its specific embodiments.

Having thus described my invention, I claim:

1. In a calender construction the combination of a series of four or more calender rolls arranged in substantial alignment, bearings for each roll, a frame, and a separate set of guides in the frame to control the bearings of one roll of each pair of adjacent rolls.

2. In a calender construction the combination of a series of four or more calender rolls arranged in substantial alignment, bearings for each roll, a frame, a separate set of guides in the frame to control the bearings of one roll of each pair of adjacent rolls, and an adjustable and separate frame support for each of the latter bearings.

3. In a calender construction the combination of a series of four or more calender rolls arranged in substantial alignment, bearings for each roll, a frame, a separate set of guides in the frame to control the bearings of one roll of each pair of adjacent rolls, an adjustable and separate frame support for each of the latter bearings, and mechanism for adjusting the frame supports.

4. In a calender construction the combination of a series of four or more calender rolls arranged in substantial alignment, bearings for each roll, a frame, a separate set of guides in the frame to control the bearings of one roll of each pair of adjacent rolls, an adjustable and separate frame support for each of the latter bearings, means to rotate all of said rolls and mechanism operable while the rolls are rotating for adjusting any one of the frame supports.

5. In a calender construction the combination of a series comprising four calender rolls in substantial alignment, a frame, bearings in the frame for each of said rolls, means to adjust the separation of the outer pairs of rolls, and means operable without disturbing the adjustment of the outer pairs of rolls for adjusting the separation of the inner pair of rolls.

6. A calender construction comprising a series of four calender rolls arranged in substantial alignment, each of the outer pairs of rolls being adapted to sheet out rubber and the inner rolls of each of these pairs being adapted to receive and present to each other the two sheets so formed, means for adjusting the separation of the rolls of each outer pair whereby the thickness of the rubber sheets may be varied, and means operable without disturbing the adjustment of the outer pairs for varying the separation between the inner rolls of each pair, whereby

the pressure with which the two sheets of rubber are pressed together may be varied.

7. In a calender construction the combination of four or more calender rollers arranged in substantial alignment, a frame to hold the rolls in operable positions, means to rotate all of said rolls, and mechanism operable while the rolls are rotating for changing the separation of any adjacent pair of said rolls without changing the separation of the other pairs.

8. In a calender construction the combination of four calender rolls arranged one over the other, a frame, a movable support in the frame to hold the two upper rolls, a support within and movable alone as well as with the movement of the first support, a movable support for the lowest roll and a fixed support for the other roll, means to rotate said rolls, and mechanism acting through said supports to move the two upper rolls together, the upper roll alone, or the lower roll alone, while the rolls are rotating.

9. In a calender construction a pair of rolls, a stationary frame support, movable frames one at each side of said rolls, bearings in the latter for the rolls, one pair of bearings constructed for movement within the frames, means to move said frames, and means to move the latter bearings in the frame.

10. A calender construction having in combination a frame, four calender rolls mounted therein, pairs of supporting posts mounted in the frame for adjustment, each one of three of the rolls being supported by a pair of said posts, means to turn each pair of supporting posts for adjusting the rolls, one pair of posts supporting in addition to its roll a pair of the supporting posts and the roll on the latter posts.

11. In a calender construction the combination of a frame, four calender rolls mounted one over the other in the frame, three cross shafts mounted on the frame, mechanism between one of the cross shafts and two of the rolls to move the latter together, mechanism between a second cross shaft and one of said rolls to move the latter alone and mechanism between a third cross

shaft and a third roll to move the latter alone.

12. In a calender construction a frame to hold the calender rolls, a supplemental frame to hold two of the rolls and movable in the main frame, bearing blocks movable in the supplemental frame to hold one of its rolls for adjustment, a pair of supporting posts threaded to the main frame and rotatably attached to the supplemental frame, a second pair of supporting posts threaded to the supplemental frame, rotatably attached to the said bearing blocks and extending respectively through central bores in said first pair of posts whereby the rolls may be adjusted by turning the posts.

13. In a calender construction the combination of a side frame to receive the ends of the calender rolls, an upper and a lower set of guides for the bearing blocks, the upper guides being spaced further apart than the lower guides, a bearing block frame mounted in the upper guides and a third set of guides in said bearing block frame corresponding to the lower set of guides.

14. In a calender construction the combination of spaced vertical frames each one receiving the ends of the calender rolls and having an upper and a lower set of guides for the bearing blocks, the upper guides being spaced further apart than the lower guides, a bearing block frame mounted in the upper guides and a third set of guides in said bearing block frame corresponding to the lower set of guides, calender rolls having bearings mounted in said guides and independently operable devices for moving a calender roll in each set of guides.

15. In a calender construction the combination of four calender rolls located to form two sheets of material and join them into one between adjacent pairs of rolls and means to control the width of said sheets as they are being formed which consists in circumferential enlargements on the ends of those rolls which act to form the sheets only, said enlargements overlapping the edges of those adjacent rolls which act to form the sheets and join them.

THOMAS MIDGLEY.