April 22, 1941. R. M. JONES ET AL 2,239,102

DRAWING MECHANISM FOR TEXTILE FIBERS

Filed May 10, 1937 3 Sheets-Sheet 1

Fig. 2

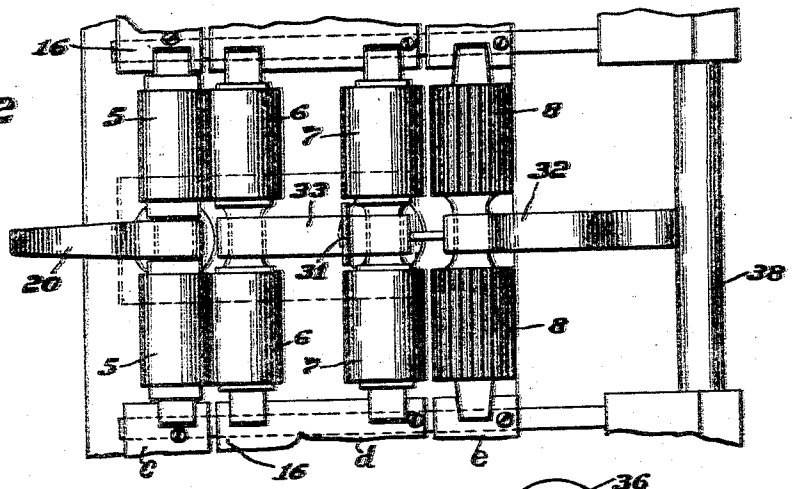
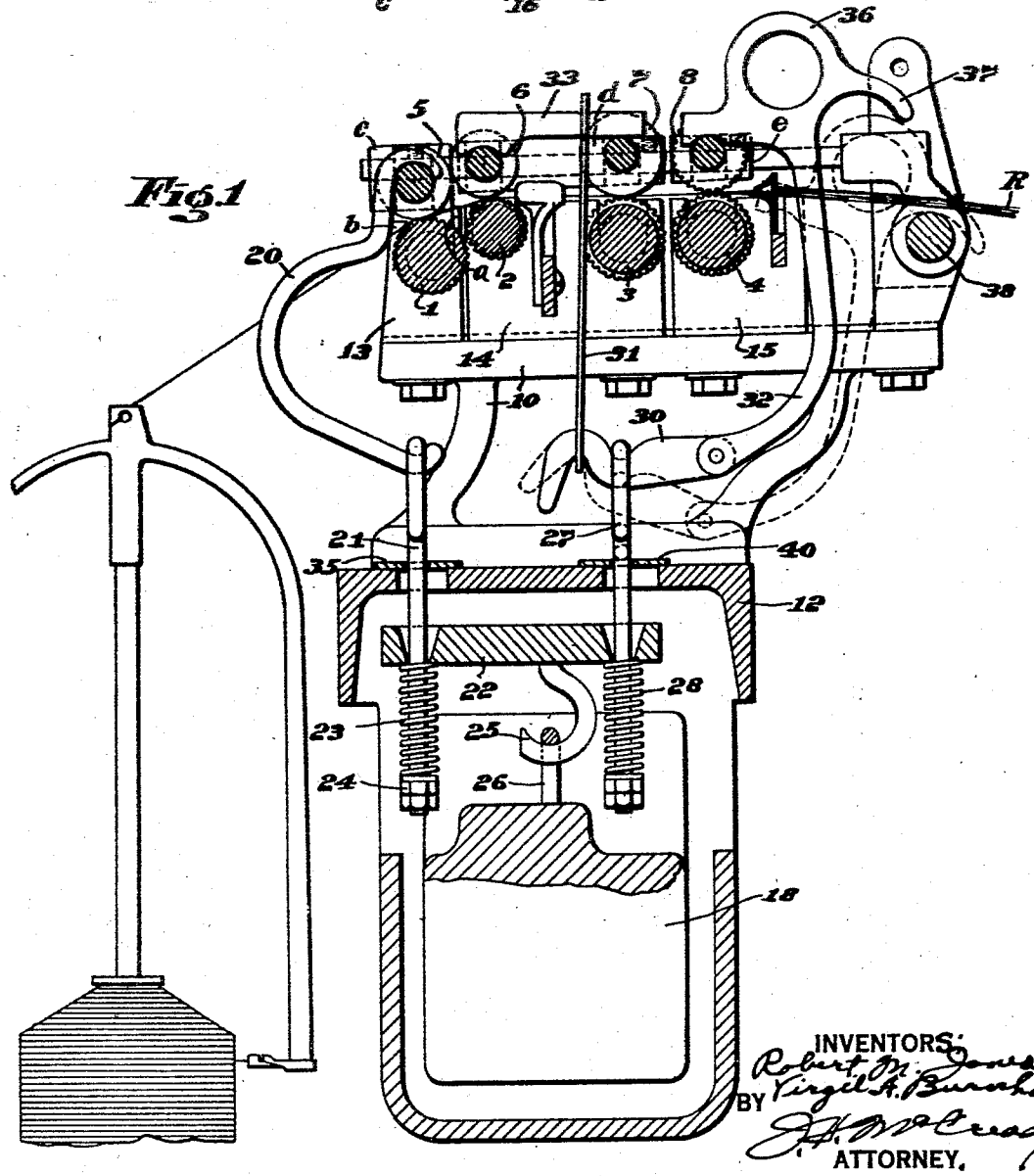



Fig. 1

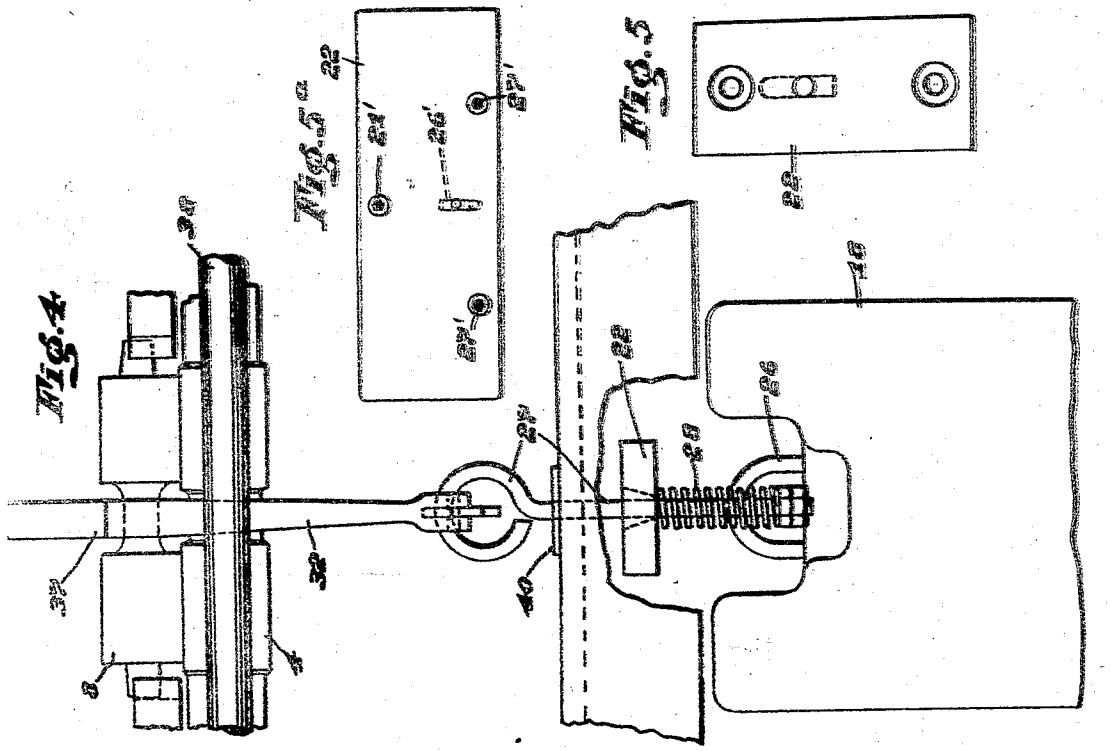


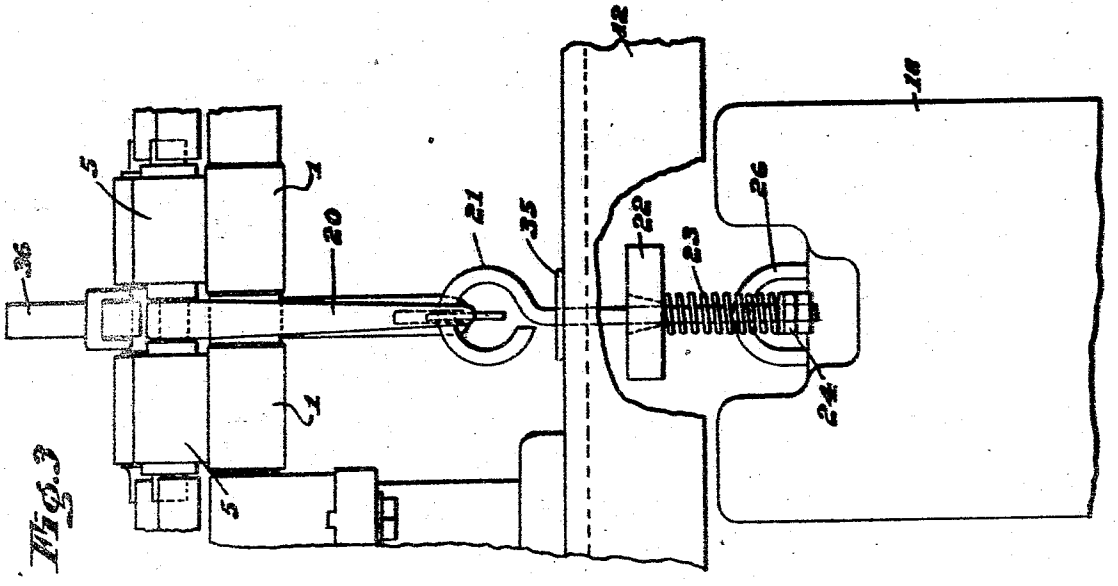

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DRAWING MECHANISM FOR TEXTILE FIBERS

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DRAWING MECHANISM FOR TEXTILE FIBERS

Filed May 10, 1937 3 Sheets-Sheet 3

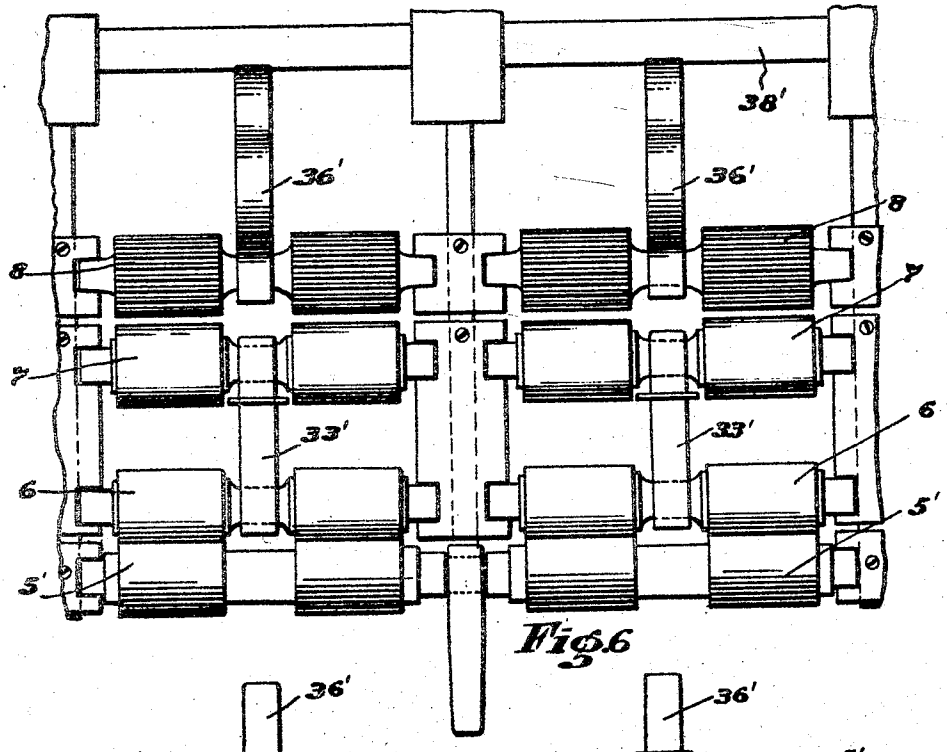



Fig. 6

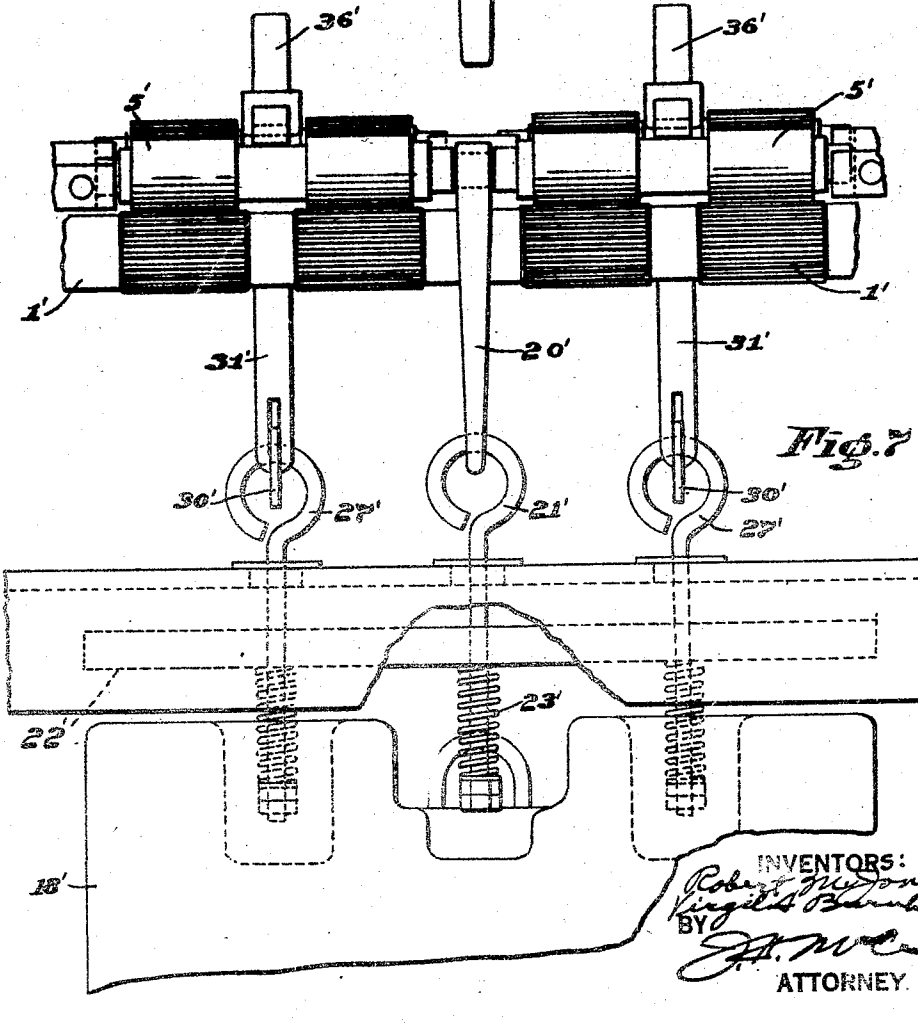



Fig. 7

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# UNITED STATES PATENT OFFICE

2,239,102

## DRAWING MECHANISM FOR TEXTILE FIBERS

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6 Claims. (Cl. 19—135)

This invention relates to drawing mechanisms of the general type used in spinning and roving frames. It is more especially concerned with the weighting means for these mechanisms.

In such machines it is necessary to apply considerable weight to the top rolls in order to make them grip the roving or sliver with sufficient firmness to perform the drawing functions. This is particularly true of those rolls which produce a high degree of drawing action, as distinguished from those which perform chiefly a feeding and holding function. Any machine of this type includes a multiplicity of drawing units, each of which consists of several pairs of rolls arranged in series and operating successively on a single (or occasionally a double) strand of roving or sliver. In order to simplify the weighting mechanism, it has been attempted to use as few weights as possible on a single series of rolls and to distribute this weight in accordance with some predetermined plan upon the different top rolls. Both these and other types of weighting mechanisms require re-arrangement or readjustment of the weights, or of the connections through which weight is distributed to the rolls, whenever the spacing of the rolls is changed. Consequently, in changing the roll spacing in a frame, with its multitude of units, much time is required in making the necessary adjustments, testing them, making the additional changes indicated by the results of the tests, and in getting the machine ready again for regular production.

The present invention deals especially with this problem, and it aims to improve the weighting apparatus for drawing mechanisms with a view to reducing the labor involved both in making the original set-up and also in readjusting the mechanism. More specifically, it is an important object of the invention to devise a weighting mechanism in which the distribution of weight to the rolls will remain constant irrespective of changes in the roll spacing.

It is a further object of the invention to provide a mechanism of this type in which the weighting apparatus will be substantially self-aligning and will automatically return to its normal position when moved out of that position and to devise an arrangement in which the weights can be easily removed for taking off the top rolls.

In addition, the invention aims to avoid the effects of momentum of the weight in the normal operation of the machine. That is, there is necessarily a more or less continuous vibration or a rapid rise and fall of the top rolls while the machine is running, due chiefly to variations in the material on which it is working. These movements are transmitted to the weights and necessarily result in changing the weighting of the rolls because of the momentum of the weights themselves. Such changes, in turn, affect the action of the rolls on the fiber and produce undesirable variations in the ultimate product. To overcome this difficulty constitutes an important object of this invention.

It is a further object of the invention to devise a weighting mechanism having the advantages above described and adapted for use in a four roll drawing frame.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a vertical, sectional view showing a drawing mechanism for a roving frame embodying the present invention;

Fig. 2 is a plan view of the drawing rolls and adjacent parts of the mechanism shown in Fig. 1;

Figs. 3 and 4 are front and rear views, respectively, of the mechanism shown in Fig. 1;

Fig. 5 is a plan view of a plate or beam which forms a part of the construction shown in Figs. 1 and 2;

Fig. 5*a* is a plan view of a similar plate or beam used in the construction shown in Figs. 6 and 7; and

Figs. 6 and 7 are plan and front views, respectively, of another arrangement constructed in accordance with this invention.

Referring first to Figs. 1 and 2, the drawing mechanism there shown comprises a front bottom roll 1, intermediate bottom rolls 2 and 3, and a rear bottom roll 4. Corresponding top rolls 5, 6, 7 and 8 rest on and cooperate with the respective bottom rolls just mentioned. As shown in Fig. 2, these top rolls customarily are made with two fiber working sections on the same roll, these sections being connected by an intermediate neck portion on which the saddle bears. The bottom rolls are supported in suitable roll stands, one of which is shown in Fig. 1 at 10, these stands being spaced apart by appropriate intervals and mounted on the frame 12. In the particular construction shown the upper surface of the stand 10 is provided with a dove-tail rib on which bearing blocks 13, 14 and 15, respectively, are mounted for adjustment

to vary the spacings of the rolls, it being observed that the intermediate rolls 2 and 3 are both mounted in the same block so that their spacing is fixed. The top rolls are held in their cooperative relationship to their respective bottom rolls by means of cap bars of any suitable construction such, for example, as those shown at 16.

The construction so far described is typical in its general arrangement of a four roll drawing unit, it being understood that in a drawing frame a series of these units are mounted end to end, and the bottom rolls of the entire series are all connected together and driven from suitable gearing located at one end of the frame. In operation the roving R, Fig. 1, is fed through the entire series of rolls, which operate on it successively, and it thence travels to a flyer of the usual type where it is twisted and wound on a suitable core.

The weighting mechanism provided by this invention and as shown in Figs. 1 and 2, is individual to a single unit, the entire weight for all of the rolls of the unit being furnished by a single weight member 18. Suitable elements run from this weight to the various top rolls and are constructed and arranged to distribute the pull of the weight in a predetermined and fixed manner to the respective rolls so that each will be weighted to the desired degree.

Referring first to the front top roll 5, a weight hook 20 provided with a bearing or saddle portion which rides on the neck of the top roll acts as a hanger to support a portion of the mass of the weight 18. For this purpose it is releasably hooked into the eye of an eye-bolt 21, the shank of which extends through holes in the frame 12 and in a bar 22 and it supports one end of this bar through the medium of a spring 23 which encircles the shank and is interposed between the lower side of the bar and a nut 24 threaded on to the lower end of said bolt. The weight 18 is suspended from the bar or beam 22 by means of a hook 25 and a loop 26 integral with or secured fast to the weight.

The opposite end of the beam 22 is similarly supported by a second eye-bolt 27 connected therewith through a spring 28 in the same manner as is the bolt 21. Thus the bar 22 becomes a floating lever. The bolt 27, in turn, is supported on a second bar or, more correctly, a floating lever 30 which is suspended by two hanger elements 31 and 32. The part 31 consists of a stirrup resting on and supported by a saddle 33 which bears on the necks of the two intermediate top rolls 6 and 7. The other member 32 is similar in construction to a weight hook and includes a saddle portion or bearing member riding on the neck of the back top roll 8.

From the foregoing description and an inspection of Figs. 1 and 2, it will be observed that the weight 18 is supported solely by being suspended from the top rolls, and that it is located directly under the rolls and within the frame. Its more immediate supporting element is the beam 22 which is supported at its opposite ends by the hangers 21 and 27, the former being suspended from the weight hook 20 and the latter from the lever 30. The division of the pull exerted by the weight 18 on these parts 21 and 27 is predetermined by the spacing of the hook 25 from the elements 21 and 27. In this particular arrangement the latter element carries a considerably larger proportion of the mass of the weight 18 than does the former. All of the weight supported by the bolt 21 is utilized in weighting the front top roll 5. That borne by the other bolt 27 is distributed through the lever 30 to the saddle 33 and hanger 32, the latter being applied solely to the rear top roll 8, while the former is divided between the intermediate top rolls 6 and 7. This distribution to the stirrup 31 and hanger 32 is determined by the spacing of the member 27 from the points of support of the lever 30 by these two elements 31 and 32, while the part of this weight carried by the stirrup and borne by the intermediate rolls 6 and 7 is distributed to them in accordance with the spacing of the point of support of the stirrup from the vertical planes of the axes of the latter rolls. This distribution of the weight to the various top rolls having once been predetermined, is not disturbed by any change in spacing of the front or rear rolls with reference to their next adjacent intermediate rolls. As above stated, the spacing of the latter rolls remains constant.

Thus in initially setting up the frame or in changing the spacing to suit the requirements of the work, no attention whatever need be paid to the weighing, this factor remaining undisturbed and depending solely on the initial design. More over, since the weight is suspended directly under the rolls through the connections above described, this whole mechanism finds its own center of gravity after any change in spacing or movement out of position, the entire weighting structure perhaps shifting more or less forward or back but adjusting itself to its normal or operative relationship.

In removing the weights for any reason as, for example, in taking out the top rolls to clear a jam, or at the end of the week, the front hook 20 is simply lifted off the roll 5 and allowed to drop. The eye of the bolt 21 drops slightly until it comes in contact with a washer 35 which normally rests on the upper flat, plate-like top of the frame 12. The rear hanger or weight hook 32 is provided with a finger piece 36 by means of which it may conveniently be lifted off the rear top roll, and it also has a tail piece 37 adapted to hook over and rest upon a rod 38 which extends longitudinally of the frame for its entire length and which serves as a rest to support this hook in its idle position, as shown in dotted lines in Fig. 1. When so supported the eye of the part 27 drops down upon another washer 40, like the washer 35, and also resting upon the top of the frame, thus taking the weight off the stirrup 31 and permitting the operator to slip the saddle 33 out from under the stirrup. The weight 18 remains supported in an elevated position by the two members 21 and 27. With this arrangement both the removal of the weighting devices from the rolls and the return to their operative positions is quickly effected. In fact, the usual operation of removing the hanger 32 from the rear roll is simply to knock it backwardly off this roll and the bar 38 is so positioned that the tail portion 37 of this hanger drops upon the bar automatically.

As above stated, in the normal running of a drawing mechanism, there is considerable vertical vibration of the top rolls produced chiefly by variations in the material on which they are working. In the weighting mechanism shown, the transmission of these minor vertical movements to the weight 18 is prevented by the springs 23 and 28. They are made relatively long and of such tension that they are continuously under a considerable degree of compression so that the vibrations are absorbed in them, the

weight remaining stationary. For this purpose its mass must be relatively great, a typical weight being in the neighborhood of, say, forty pounds, although this factor obviously will be varied in accordance with the requirements of the work. However, the arrangement is such that no appreciable rise and fall of the weight 18 occurs under normal running conditions. Thus the variations in weighting that otherwise would be caused by momentum or kinetic energy created in the weight due to movements produced in it are avoided. In addition, a more uniform weighting condition is obtained. In other words, the respective rolls are held with a more uniform pressure against their cooperating lower rolls or against the material fed between them. Thus, with this arrangement, a very uniform and predetermined spring loading of the rolls is readily maintained. The mass of the weight 18 determines the total load, but it acts for that particular load just as though it were secured to, or a part of, the frame. The springs, on the other hand, are moving very slightly, but almost constantly, when the machine is running and they thus absorb those vibrations produced by variations in the roving. In this arrangement, therefore, the advantages of spring and dead weight weighting are combined, while avoiding the disadvantages of both. We believe that we are the first to devise a weighting mechanism in which this result is accomplished.

Since all the weights and springs of the entire frame, together with parts of the mechanism for transmitting the pull of the weights to the rolls, are mounted inside the frame, they are protected from dust and fly, are out of sight, and the top of the frame is left clear and free from complications. This is an important practical advantage in facilitating the matter of keeping the frames clean. While the washers 35 and 40 which close the holes through the top of the frame could be dispensed with, they are of advantage in contributing to this matter of cleanliness and permitting the use of larger holes for the lateral movement of the eye-bolts without making other parts unduly large than otherwise would be possible.

In some drawing frames a single unit instead of handling two strands of roving or "ends," as in the construction above described, is designed to handle four ends. Such an arrangement is illustrated in Figs. 6 and 7. This construction may be considered as consisting of two units like those shown in Figs. 1 and 2 except that the front rolls are replaced by rolls which are common to both units. Thus, as shown in said figures, two sets of top rolls 6, 7 and 8, like those shown in Figs. 1 and 2, are used but the front top roll 5' extends across the entire unit and is provided with four cots or other fiber working members. The front bottom roll 1' cooperating with the top roll 5' is made in a similar manner, but bottom rolls, like those shown at 2, 3 and 4, Fig. 1, are employed to cooperate with the respective top rolls 6, 7 and 8.

In such a frame a weighting mechanism constructed in accordance with the same principles as those embodied in the arrangement above described may advantageously be employed. As shown in the drawings, the top front roll 5' is weighted by a single weight hook 20' corresponding to the weight hook previously referred to and connected through an eye-bolt 21', spring 23' and lever 22' to a weight 18', these connections being exactly like those shown in Fig. 1. Likewise, the rear rolls 8 and intermediate rolls 6 and 7 are weighted in the same manner as shown in Fig. 1, the corresponding parts being designated by the numerals used in Fig. 1, but these numerals being primed. Thus in this arrangement there is a front eye-bolt 21' and two rear eye-bolts 27', these bolts passing through the beam 22' in the relationship shown in Fig. 5. The weight 18' is suspended from the plate 22' and operates through the connections just described to apply the necessary pressure upon all of the top rolls, this pressure being distributed in the same general manner above explained. This arrangement is much simpler than those used heretofore in a drawing frame of this character. In addition, it produces the advantage of being automatically self-alining or self-normalizing, the weighting mechanism is unaffected by changes in the spacing of the front and rear rolls from the intermediate rolls, the weights are easily removed when necessary for any reason, and the springs cooperate with the weights in exactly the manner above described in connection with Figs. 1 and 2 to eliminate disturbances that otherwise would be produced by the motion of the weight.

In order to facilitate the erecting and fixing operations in the mill, the rear upright flange of the front bearing block 13 for the lower roll 1 is extended upwardly to a higher elevation than the front flange *b* and the top front cap bar *c* is pushed back against the inside of the flange *a*. The lower bearing blocks 13, 14 and 15 have previously been set at the proper distances from each other, this setting usually being performed with the aid of gages of the proper thickness to space these blocks properly from each other. Consequently, by locating the cap bar *c* in the manner just described, it is certain that this member is in the correct position to hold the top front roll 5 in the desired relationship to its cooperating lower roll 1 with the axis of the upper roll spaced forwardly of that of the lower roll by the correct distance. Next, by using the same gage that was used in spacing the bearing blocks 13 and 14 from each other, and inserting it between the front cap bar *c* and the second top cap bar, the last mentioned member can be accurately positioned. Similarly, by using the gage with which the bottom blocks 14 and 15 were spaced from each other, the rear cap bar *e* can be properly spaced from the second cap bar *d* and secured in its adjusted position. With this novel arrangement, therefore, and the initial positioning of the top cap bar *c* against the flange *a* of the bottom block 13, the accurate spacing of all the cap bars is quickly and easily effected.

While we have herein shown and described typical embodiments of our invention, it will be understood that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described our invention, what we desire to claim as new is:

1. In a drawing mechanism, the combination with four pairs of top and bottom drawing rolls and means supporting them in a series for operation successively on a roving and to feed said roving continuously through the series from one pair of rolls to the next, of means for weighting the top rolls of said series comprising a saddle bearing on the two top intermediate rolls, additional saddles bearing on the front and rear top rolls, a weight, and connections for suspending said weight from said top rolls, said connections in-

cluding hangers supported, respectively, by said saddle and said front and rear top rolls and the connections being constructed and arranged to distribute the pull of said weight in predetermined proportions on the latter top rolls and said saddle.

2. In a drawing mechanism, the combination with a series of pairs of top and bottom drawing rolls, and means supporting them for operation successively on a roving and for feeding the roving continuously through said series, of means for weighting the top back roll of said series comprising a hanger suspended from said back roll and a rest located closely adjacent to said hanger in position to catch said hanger and support it when it is knocked rearwardly off the back roll.

3. In a drawing mechanism, the combination with a series of pairs of top and bottom drawing rolls, and means supporting them for operation successively on a roving and for feeding the roving continuously through said series, of means for weighting the top back roll of said series comprising a hanger, said frame including a rod extending horizontally of the frame and located behind said hanger, and said hanger having a hook portion so related to said rod as to catch on the rod and be supported thereby when the hanger is knocked rearwardly off said back roll.

4. In a drawing frame, the combination with two drawing units located side by side in said frame and each comprising four pairs of top and bottom rolls, means supporting said units for operation successively on parallel rovings, each of said units serving to feed two rovings continuously through its respective series of rolls, of means for weighting the top rolls of both said units comprising a weight, saddle members bearing on the respective pairs of intermediate top rolls in both units, a floating lever from which said weight is suspended, a pair of hangers supporting the rear end of said lever and supported jointly by said saddle members and weighting members bearing on the top rear rolls, a single hanger supported by the top front rolls of said units and supporting the front end of said lever, said hangers suspending said lever from the top rolls of said units, and means for distributing the pull of said pair of hangers upon all of said members for weighting the intermediate and rear rolls.

5. In a drawing mechanism, the combination with four pairs of top and bottom drawing rolls and means supporting them in a series for operation successively on a roving and to feed said roving continuously through the series from one pair of rolls to the next, of means for weighting the top rolls of said series comprising a saddle bearing on the two top intermediate rolls, a floating lever, a stirrup connecting said saddle with one end of said lever, two hooks having upper end portions riding on the front and rear rolls, respectively, the hook for said rear roll being pivotally connected to the end of said lever opposite the connection thereto of said stirrup, and means for weighting the hook for said front roll and said floating lever including a weight and a second floating lever from which it is suspended and which is itself suspended from the first mentioned floating lever and said front hook.

6. In a drawing mechanism, the combination with four pairs of top and bottom drawing rolls and means supporting them in a series for operation successively on a roving and to feed said roving continuously through the series from one pair of rolls to the next, of means for weighting the top rolls of said series comprising a saddle bearing on the two top intermediate rolls, a floating lever, a stirrup connecting said saddle with one end of said lever, two hooks having upper end portions riding on the front and rear rolls, respectively, the hook for said rear roll being pivotally connected to the end of said lever opposite the connection thereto of said stirrup, and means for weighting the hook for said front roll and said floating lever including two hangers depending respectively from said lever and front hook, coiled springs through which said hangers extend, with the lower ends of said hangers supporting the respective springs, and a bar against which the upper ends of said springs bear.

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