Dec. 18, 1928. 1,695,659

J. P. MACKIE

DOFFING MECHANISM FOR SPINNING, TWISTING, AND LIKE MACHINES

Filed April 30, 1927 3 Sheets-Sheet 1

Fig.1.

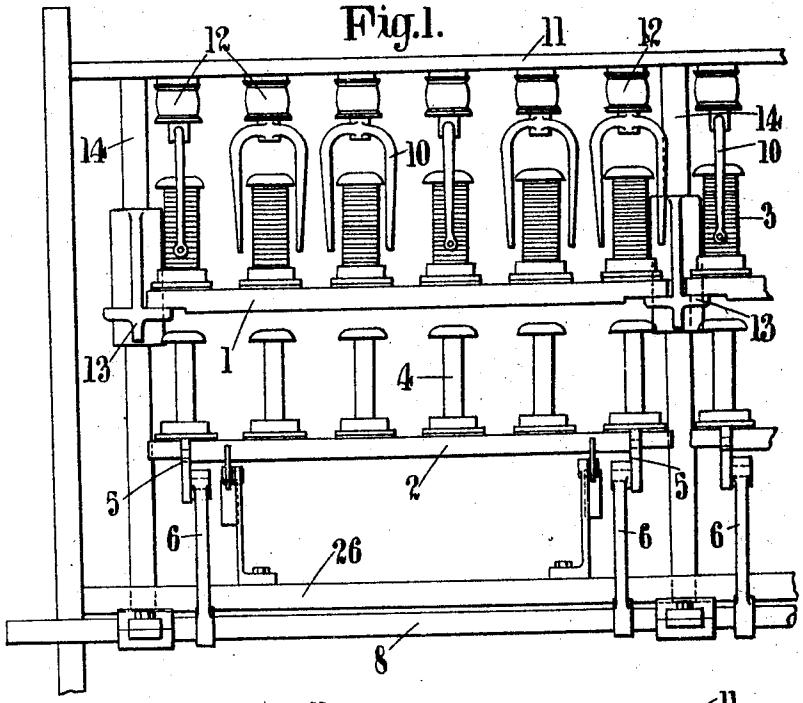


Fig.2.

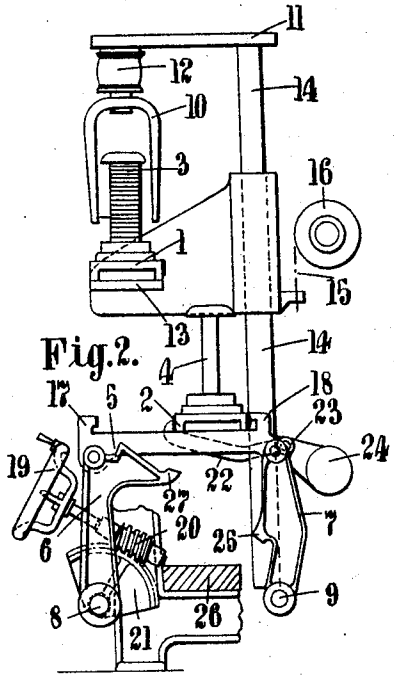
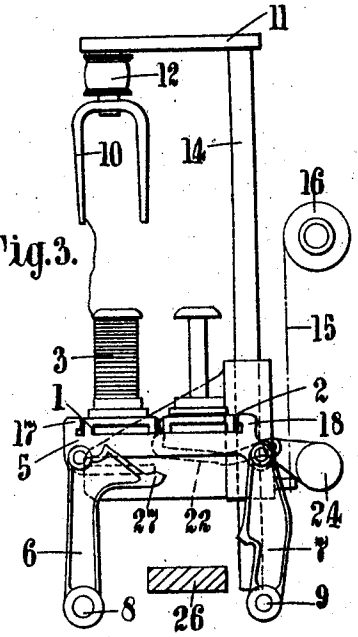


Fig.3.



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Fig.4.

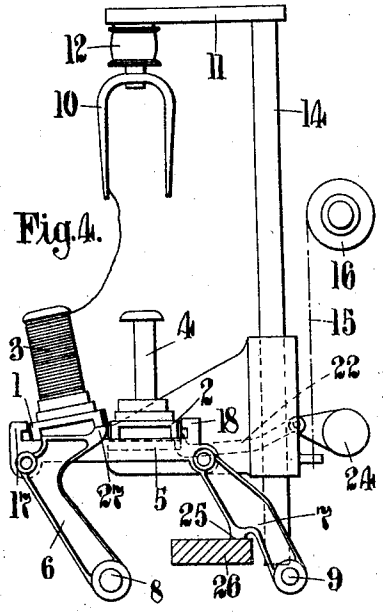


Fig.5.

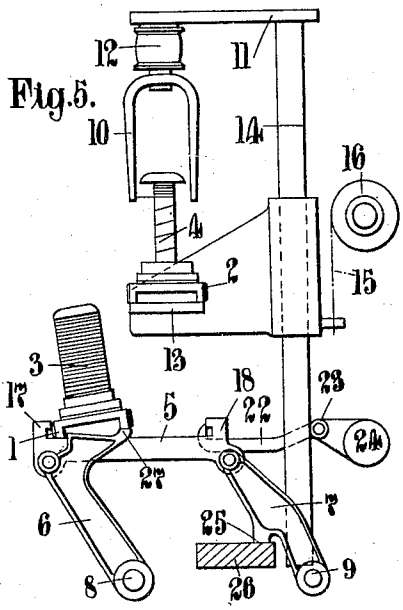


Fig.6.

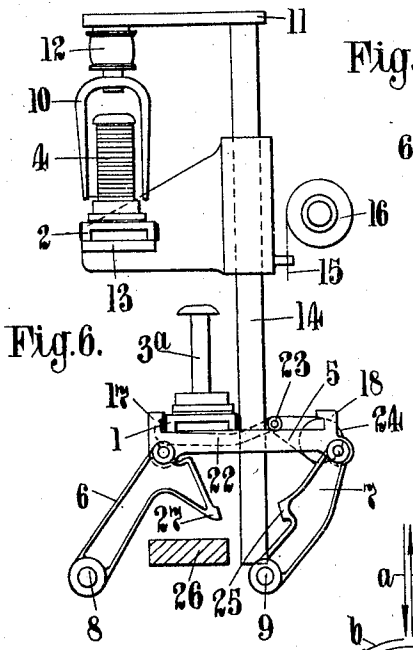


Fig.8.

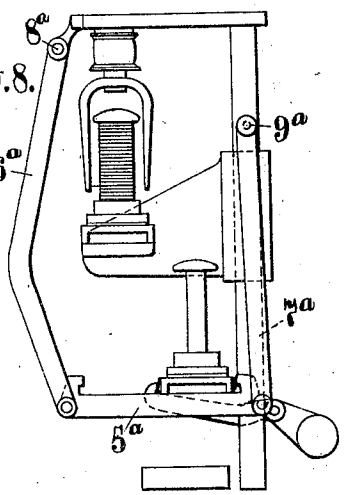


Fig.7.

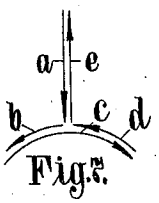
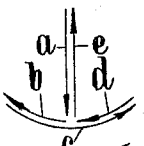


Fig.9.



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Fig. 10.

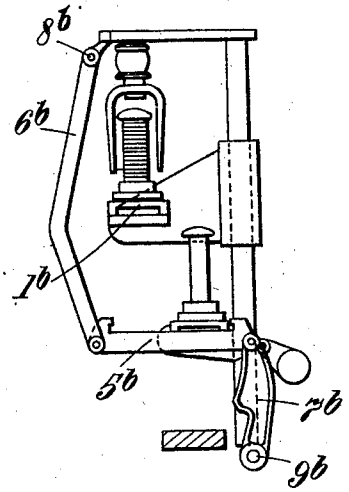
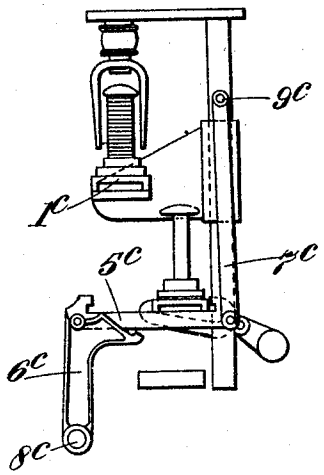


Fig. 11.



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UNITED STATES PATENT OFFICE.

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DOFFING MECHANISM FOR SPINNING, TWISTING, AND LIKE MACHINES.

Application filed April 30, 1927, Serial No. 187,945, and in Great Britain July 19, 1926.

This invention relates to doffing motions for spinning, twisting, and like machines, and more particularly it is concerned with mechanism of the class in which bobbins are supported on spindles projecting upwards from interchangeable bobbin rails which are arranged to be moved so as to bring a series of empty bobbins into their spinning positions within the flyers, and when the bobbins have been filled are moved to carry these bobbins to a position in which doffing is facilitated and in which a bobbin rail carrying empty bobbins can be brought into a convenient position to enable them to replace those in the flyers with as little delay as possible when those in the flyers have been filled.

It is the main object of the present invention to improve the mechanism for effecting the movement of the bobbin rails from one position to another while facilitating the actual doffing, and at the same time to enable the mechanism to carry out its function in such a way that it need not project beyond the line of flyers when in operation, and consequently, does not obstruct the attendants looking after the frames.

According to the present invention, a doffing motion is constructed with mechanism for moving the filled bobbins to the doffing position, and for moving the empty bobbins into the position in which they may be engaged by the lifter mechanism, comprising a rocking frame including swinging arms mounted on shafts, one or both of which may be actuated by suitable mechanism for swinging the frame into the various positions required during the transfer and doffing operations. The bobbin rails are supported on this frame and are moved by it from the forward to the rearward position, and vice versa. Thus, apart from the vertical movements for raising the bobbins into the flyers and lowering them again, the movement of the bobbin rail is along the arc of a circle, the radius of which depends upon the lengths of the arms carrying the swinging frame. The curvature of this path may be upwards or downwards depending upon whether the arms are pivoted at points above or below the swinging frame. The swinging of the frame may be effected by suitable mechanism such as toothed gearing or levers for actuating one or both shafts about which the swinging arms are mounted.

It is preferred to arrange for the bobbin rail to be tilted forward when in the forward position as this not only facilitates the doffing of the filled bobbins and the replacing by empty bobbins, but also renders easy the process of winding-on from the full to the empty bobbins. Suitable stops may be provided on one or both sets of swinging arms to limit the swinging movement, and counterweighted hooks or spring catches or the like may be provided for retaining empty bobbin-rails in the retracted position while the frame swings forward ready to receive the descending rail of fully wound bobbins.

In order that the invention may be clearly understood and readily carried into effect, one form of doffing mechanism in accordance with the invention is illustrated in the accompanying drawings, in which:—

Figure 1 is a front view of part of the machine and Figure 2 a side view showing the mechanism in an intermediate position ready to receive on the swinging frame the rail of bobbins which are shown as being filled;

Figure 3 is a similar view showing the rail of filled bobbins lowered on to the frame;

Figure 4 is again a similar view showing the frame swung into the forward position;

Figure 5 is yet again a similar view showing the rail of empty bobbins raised into the spinning position within the flyers;

Figure 6 is a similar view showing the mechanism after the empty bobbins are partly filled, and with the filled bobbins replaced by empty bobbins, the frame having swung backwards to carry the empty bobbins into the rearmost position;

Figure 7 is a diagram showing the path of the successive movements in the cycle through which the bobbin rails pass;

Figure 8 is a side view showing a modified form of doffing mechanism;

Figure 9 is a diagram similar to Figure 7 showing a modified cycle of movement when the swinging frame is supported from above; while

Figures 10 and 11 are side views showing yet two further modifications.

In the form of doffing motion shown in Figures 1 to 6 of the drawings, the spinning machine has two sets of interchangeable bobbin rails 1, 2, the former being shown in Figures 1 and 2 supporting the bobbins 3 which are in the spinning position, and are almost

filled. The rail 2 in Figures 1 and 2 is shown supporting empty bobbins 4 which, in the manner which will appear hereinafter, have been moved into the rear position so that they can take the place of the bobbins 3 and the latter can be easily doffed.

The transfer mechanism is a swinging frame which consists of a pair of horizontal bars 5, one at each end of a bobbin rail, and each pivoted to the upper ends of two swinging arms 6, 7 which at their lower ends are mounted to rock about fixed shafts 8, 9. The bobbin rails 1 and 2 are of such a length that they can extend between the upper bars 5, and, therefore, may be supported at their ends on the two bars 5; in fact, in Figures 1 and 2 the rail is shown so supported. The flyers 10 are supported on the upper part of the main framework 11 of the machine and are driven through a band engaging with pulleys or whorls 12. The lifting mechanism comprises brackets 13 guided on the standards 14 of the machine in its rising and falling movements. The brackets 13 are given an up-and-down motion for effecting the building operation, this motion being transmitted to it through the chain 15 and sprocket wheel 16 which may have any usual connection to the building cam. The brackets 13 are also capable of an additional motion to a lower level to enable the bobbin rail 1 or 2 to be deposited on to its pair of horizontal bars 5, and to enable an empty bobbin rail to be lifted from the bar 5 upwards into the spinning position.

The two horizontal bars 5 which constitute the supporting platform for the bobbin rails 1, 2 have stops 17, 18 at their forward and rearward ends, with a space between them sufficient to receive a pair of bobbin rails 1, 2. The swinging arms 6, 7 and the bars 5 are operated simultaneously by rotating the shaft 8 or the shaft 9 or both, to which the arms 6, 7 are secured as, for example, by the hand wheel 19, worm 20 and sector 21. The mechanism can be brought into three principal positions:—The intermediate position in which the arms 6, 7 are substantially vertical is illustrated in Figures 2 and 3; the forward position is shown in Figures 4 and 5, and the rearward position in Figure 6.

The actual condition of affairs in the various positions can be most clearly understood by considering the sequence of movements in doffing a rail of filled bobbins and replacing it by a rail of empty bobbins. It is convenient to commence from the position shown in Figure 2 where the bobbins 3 are almost filled, and are, therefore, almost ready for doffing. It will be seen that the empty bobbins 4 with the rail 2 are at the rear of the upper bars 5 leaving a space in front of them sufficiently wide to receive the rail 1 after the bobbins 3 are filled. Moreover, the arms 6, 7 have been turned into the intermediate position wherein the vacant space for the rail 1 lies immediately below that rail. The first operation after the bobbins 3 are filled is to lower the brackets 13 until they descend below the level of the upper surface of the bars 5. This leaves the rail 1 resting on the two bars 5. This state of affairs is illustrated in Figure 3. Incidentally, as will be explained more fully later, the rear part of the rail 1 by its weight and the weight of the bobbins 3 has depressed the forward end of a hook or catch 22 pivoted in the main framework or on suitable brackets or supports at 23 and counter-balanced by a weight 24. This catch 22 can be seen in Figure 2 retaining the rail 2 in the rearward position, and in Figure 3 depressed so as to release the rail 2.

The next motion is to rock the shaft 8 or 9 so that the arms 6, 7 take up the forward position seen in Figure 4. It may be mentioned here that the forward position is defined or limited by a projecting stop or abutment 25 on the two arms 7 coming into contact with a horizontal cross-bar or beam 26 as seen in Figures 4 and 5. The result is that the filled bobbins 3 on their rail 1 are brought to the front of the machine in a position convenient for doffing and the empty bobbins 4 on their rail 2 are brought into a position immediately below the flyers 10, and therefore only need to be raised to take up the spinning position. In Figure 5 as a matter of fact, the lifter brackets 13 are shown as raised having lifted the bobbins 4 into the spinning position.

As can be seen in Figures 4 and 5, the arms 6 are shaped with offset portions 27 which in the forward position of the arms 6 rise up and engage the rear part of the bobbin rail 1 tilting that rail and the bobbins 3 upon it slightly forward. This tilting action facilitates the doffing of the machines in this position, and also, as a matter of fact, enables the winding-on operation to the empty bobbins 4 to be easily carried out.

Now, while spinning goes on and the bobbins 4 are being filled, the filled bobbins 3 are rapidly doffed and the rail 1 is filled with empty bobbins in the forward position shown in Figures 4 and 5. The next operation is to swing the arms 6 and 7 into the required position by rotating the shaft 8 or 9 and the position attained is illustrated in Figure 6. The empty bobbins 3a which have replaced the filled bobbins 3 on the rail 1 are thereby moved into a position to the rear of the spinning position until the catch 22 engages with the rail 1. The segment 21 is brought to rest in the correct position. The mechanism can be left in this position until the bobbins 4 are filled, but preferably the arms 6, 7 are swung in to the intermediate position shown in Figure 2 and already described. It is here, however, that the purpose of the pivoted catch or hook 22 is manifest, for the rail 1 in its rearward movement

has ridden over the forward end or nose of the catches 22, temporarily depressing them, but they rise again under the effect of the weights 24 engaging in front of the rail 1. Thus, in passing from the position shown in Figure 6, the arms 6 and 7 moving to the intermediate position, the rail 1 cannot move forward with the bars 5, but is retained by the hooks 22 being lifted slightly as the bars 5 rise, but the bars 5 during this movement slide frictionally under the rail 1 as they are not able to draw the latter with them. The conditions are then as shown in Figure 2, and the mechanism is ready for repeating the cycle.

It will be realized that in a long spinning, twisting or like machine, the "side" may be divided into several sections of bobbin rails, each section of rail having a pair of horizontal bars 5, and arms 6 and 7 and counterweighted catches or hooks such as 22. By this construction no fixed or permanently projecting guides are required for the doffing which would extend beyond the front of the machine, and thus impede the attendants in their work of doffing and operating the mechanism. The swinging arms 6, 7 are only moved forward to bring filled bobbins into the doffing position, and almost immediately moved back again out of the way as soon as the filled bobbins have been replaced by empty ones.

In Figure 7, a diagram is shown illustrating the sequence of movements of the bobbins commencing in the position shown in Figure 2. The descent of the filled bobbins is illustrated by the arrow *a*, and their forward movement into the doffing position is illustrated by the arrow *b*. At this forward point, they are replaced by empty bobbins, and the path of movement of the empty bobbins from the foremost position to the rearmost position as illustrated by the arrow *c* has the shape of a circular arc. The further movement of the empty bobbins into the intermediate position below the flyers is illustrated by the curved arrow *d*, and finally the lifting movement into the filling position is illustrated by the vertical arrow *e*. The curvature of the arrows *b*, *c*, *d*, is, of course, due to the radii of the movements about the centres 8 and 9, the curvatures depending upon the length of the arms 6 and 7.

In the modified arrangement shown in Figure 8, the bars 5^a are carried on arms which are pivoted about axes 8^a and 9^a above the bars 5^a, then the movement from front to rear and vice versa of the bars 5^a and the bobbins is curved downwardly and the cycle of movements shown in Figure 7 is then modified into the cycle shown in Figure 9 in which corresponding reference letters have been applied to the arrows. The remaining parts of the mechanism in Figure 8 bear the same reference numerals as in the preceding figures and need not be described again in detail. In this latter case, although not shown in Figure 8, the bobbins may be tilted forwardly in the doffing position by projections on the rear pair of arms 7^a engaging under the rear end of the filled bobbin rail 1 in a manner similar to that shown for the projections 27 in Figures 4 and 5.

In a further alternative as shown in Figure 10, the front of the bars 5^b are carried by arms 6^b pivoted above the arms 5^b at the points 8^b, and the rear of the bars 5^b are carried by arms 7^b pivoted at 9^b below the bars 5^b. In yet a further modification shown in Figure 11, this arrangement is inverted, in the sense that the bars 5^c are carried at the front by arms 6^c pivoted below the bars 5^c and 8^c, and at the rear are carried by arms 7^c pivoted above the bars 5^c at the points 9^c. In Figures 10 and 11, the rails carrying the filled bobbins are illustrated at 1^b and 1^c.

Any convenient mechanism may be provided for rocking the arms 6 and 7, and although a hand wheel 19, worm 20 and segment 21 is shown in Figure 2 and it has been mentioned that the operation may be effected by rocking one or both of the shafts 8, 9, it will be obvious that the arms 6, 7 may themselves be linked to members to which a movement is imparted for swinging the frame from one position to another.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. A doffing motion for spinning, twisting and like machines, comprising in combination, a pair of interchangeable bobbin rails, a support for the same comprising a rocking frame pivotally mounted on the framework of the machine, and mechanism for swinging said frame into positions required during the transfer and doffing operations.

2. A doffing motion for spinning, twisting and like machines comprising in combination, a pair of interchangeable bobbin rails, a supporting frame for said rails consisting of arms pivotally mounted upon the framework of the machine, and a substantially horizontal platform secured to said arms, and mechanism for swinging one of said arms about its pivotal axis.

3. A doffing motion for spinning, twisting and like machines, comprising in combination, a pair of interchangeable bobbin rails, a support for said rails consisting of a substantially horizontal platform, a plurality of pairs of arms carrying said platform and pivoted to the framework of the machine about axes below said platform, and mechanism for swinging one of said arms about its pivotal axis and thereby moving said platform along the arc of a circle having an upward curvature.

4. A doffing motion for spinning, twisting and like machines, comprising in combina-

tion, a pair of interchangeable bobbin rails, a support for same consisting of a rocking frame pivotally mounted on the framework of the machine, mechanism for swinging said frame between a forward doffing position and a rearward position, a plurality of fixed supports, and a plurality of counter-weighted catches pivoted on said supports so as to retain a bobbin rail when the latter is carried into the rear position.

5. A spinning, twisting or like machine, comprising in combination a stationary framework, a set of flyers journalled therein, driving means for said flyers, a rocking frame pivotally mounted on said framework, a pair of interchangeable bobbin rails supported on said frame, mechanism for rocking said frame for carrying said rails between the doffing and rear positions, lifter brackets for raising said rails into the spinning position, and a builder motion for reciprocating either of said rails and the bobbins carried thereby during the spinning operation.

6. A doffing motion for spinning, twisting and like machines, comprising in combination, a pair of interchangeable bobbin rails, a substantially horizontal platform for supporting same, forward and rearward rocking arms pivoted to the framework of the machine and carrying said platform, said forward rocking arms being shaped to tilt a bobbin rail from said platform when in the forward position, and mechanism for rocking one of said arms to swing said platform in the arc of a circle between forward and rearward positions.

7. A doffing motion for spinning, twisting and like machines, comprising in combination, a pair of interchangeable bobbin rails, a substantially horizontal platform supporting same, swinging arms carrying said platform and pivotally mounted upon the framework of the machine, mechanism for swinging one of said arms to move the platform between forward and rearward positions, and a cross beam located in position to be engaged by one of said arms in order to limit the forward motion of said platform.

In witness whereof I hereunto subscribe my name this 11th day of April, 1927.

JACK P. MACKIE