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W. H. ARNOLD-FORSTER.

APPARATUS FOR DOFFING SPOOLS FROM THE SPINDLES OF FLY FRAMES.

APPLICATION FILED MAR. 29, 1905.

2 SHEETS—SHEET 2.

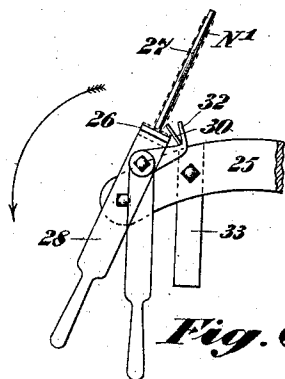


Fig. 6.

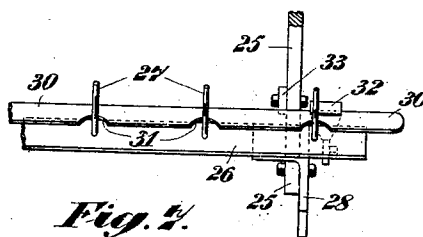


Fig. 7.

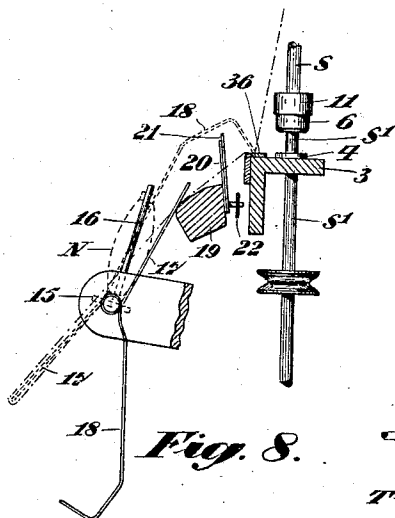


Fig. 8.

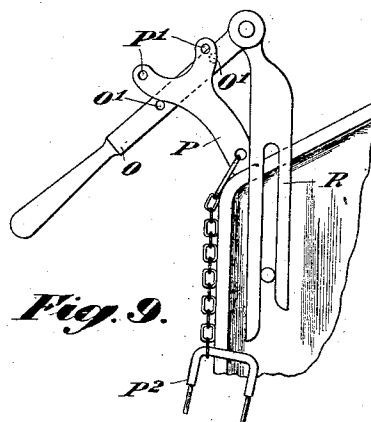


Fig. 9.



Fig. 11.

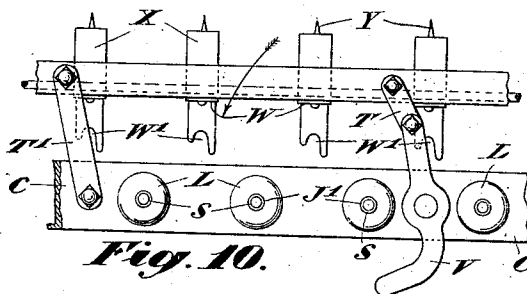


Fig. 10.

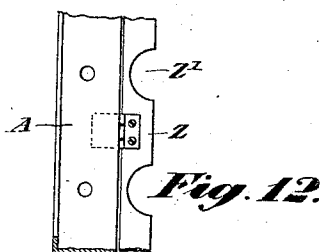


Fig. 12.

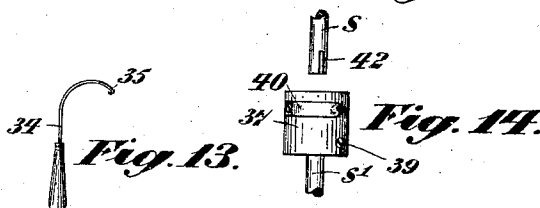


Fig. 13.



Fig. 14.



Fig. 15.

Witnesses:

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APPARATUS FOR DOFFING SPOOLS FROM THE SPINDLES OF FLY-FRAMES.

No. 869,044.

Specification of Letters Patent.

Patented Oct. 22, 1907.

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To all whom it may concern:

Be it known that I, WILLIAM HOWARD ARNOLD-FORSTER, a subject of the King of Great Britain and Ireland, whose postal address is Greenholme Mills, Burley in Wharfedale, in the county of York, England, have invented certain new and useful Improvements in Apparatus for Doffing the Spools from the Spindles of Fly-Frames, of which the following is a specification.

This invention relates to improvements in apparatus for what is known as "doffing" the spools from the spindles of fly spinning frames, and has for its object, the construction and arrangement of certain parts and mechanism, whereby the full spools are removed, or "doffed" from the spindles in a downward direction, and empty spools or tubes replaced on the spindles. Various attempts have been made to modify the ordinary arrangement, according to which as at present in use, the full spools of a fly spinning frame are "doffed" by hand, that is to say, the flier has to be unscrewed in each instance and removed, the full spool drawn upwards, the empty spool placed on the spindle, and the flier screwed on to the top of the spindle. It is customary to have in each fly spinning room a number of operatives known as "doffers" whose duty it is to carry out the above mentioned operation, and should several frames require "doffing" at the same time, a waste of time is incurred in that the "doffers" can only perform such operation as I have described on one machine at a time, or a reduced number of "doffers" on two or more frames. The spindles are usually provided with a free upper end in order that the flier may be removed, and this results in unsteadiness of running, owing to there being no support at the top of the spindle. According to my invention, I "doff" the spools in a downward direction, the head of the spindle being provided with bearings as hereinafter described. By my apparatus, a considerable number of spindles are "doffed" simultaneously in one operation, and the empty spools placed on said spindles as a continuation of the said operation. In order to accomplish this, the spindle is formed in two portions as hereinafter described. By constructing the spindle and the "doffing" mechanism in accordance with my improvement, the disadvantage of unsteadiness is obviated, and a reduction in the labor required for the "doffing" is effected.

In describing my invention in detail, reference is made to the accompanying sheets of drawings, in which,

Figure 1 represents a front view of a portion of a spinning frame with my improvements attached thereto; Fig. 2 is a vertical section taken on line *a-b*, Fig. 1; Fig. 3 is a vertical section showing the spindle and one method of construction of the joint between the two parts thereof; Fig. 4 is a side elevation of the spindle steadiers, and spikes; Fig. 5 is a side elevation, showing the mechanism for lifting the upper portion of the spindles; Fig. 6 is a side elevation of the upper spool rail;

Fig. 7 is a plan of the parts shown in Fig. 6; Fig. 8 is a side elevation of the lower spool rail, the cutters and the thread tightener; Fig. 9 is a detail of turning gear for the upper bar; Fig. 10 is a plan of the upper spindle bearing and of the bar carrying the spindle steadier; Fig. 11 is a section of lifter bar and washer holder; Fig. 12 is a plan of the device illustrated in Fig. 11; Fig. 13 is a view of the threader; Figs. 14 and 15 are views illustrating details of a form of joint for the two halves of the spindle.

In the above drawings, the fly spinning frame lifter bar A, and the driving gear are of the ordinary description. Mounted on suitable brackets G and crossing the front of the frame is a plate or bar C, which is carried in bearings B at either end of each section of the frame, in such a manner that the said bar may be turned round, and when desired lifted upwards. This operation may be performed by the means shown in Fig. 5, namely, a lever or levers D attached to each end of a shaft D' mounted towards the base of the front of the frame. Rods F connect the levers D to levers E, and these latter are fulcrumed at E' to the before mentioned brackets G, attached in any convenient manner to the framework of the machine. The other ends of levers E are attached to blocks H, which engage with the bar C at either end. Guides G' are attached to brackets G and pass preferably through the blocks H in order to insure a vertical travel. It will be readily understood that in pressing down the lever or levers D, the blocks H and thereby the bar C will be raised as desired, or vice versa. In the said bar C are formed apertures C', Fig. 3, for the reception of the upper ends of the spindles S, such ends being threaded at J with a left handed thread. Around the apertures C' are formed bearings K, and covers L (Figs. 3 and 10) are screwed over the upper ends of the spindles S, such covers revolving with the said spindles in bearings K, lubrication being provided from the cup shaped recess, as shown in Fig. 3. The spindle S, or the upper half of same, (as the said spindles are made in two portions as hereinafter described) is held in the bar C by the cover L, and will move with the same, the fliers M being screwed on or otherwise firmly secured to the said spindles. It will be readily understood that by this arrangement it is impossible to draw the spools N upward as hitherto. The said bar C is provided at one end with a hand lever O, (Fig. 9) having apertures O' in the same, and a bracket P is attached to the machine having apertures P' in the same, and a pin P² is passed through apertures P' and O', in order to hold the bar C in one of the desired positions and preserve the parallelism of the said spindles with a similar number of pegs situated toward the base of the machine, as hereinafter described. A guide R, as shown in Fig. 9, is attached to the said bar. Attached to the bar C (Fig. 10) by levers T and T' is another bar U, the said levers being so arranged that the bar U may be operated to or from the bar C as desired by means of

a handle V. Attached to the bar U (Fig. 4) is a plate or plates W, and such plate or plates, which project in a downward direction, are provided at the ends with a projection cut out at W' for the purpose hereinafter described. Attached by hinges X' to the end of plate W are bent strips X of suitable metal (Fig. 4) in which are mounted needles or spikes Y, such needles being when desired turned towards the spools N on the spindle S, in order to retain the spools in position when the spindles have been lifted as hereinafter described.

To the lifter rail or bar A, operated in the ordinary manner, is attached by a hinge or hinges a plate Z substantially of the form shown in Figs. 2, 11 and 12, such plate being cut out at intervals as shown at Z', (Fig. 12). The said plate may be turned over towards the spindle, and the cut away portion Z' pass around the base of the spools, and press the washers 1 (Fig. 3) against the lifter rail, thus holding the washers in position as is hereinafter described.

The spindles are constructed in two halves S and S' (Fig. 3) the lower half S' being retained between lower bearings 2 and spindle rail 3, and adapted to be driven in any convenient manner. Said lower halves of the spindles extend above the rail 3 and have supporting bearings 4 therein; there being bosses 6 attached to them by means of set screws 5 and preferably threaded at their upper ends as indicated at 7. The opening in which the spindle is fastened extends through the boss 6 and is enlarged at its upper portion as indicated at 8. Within this opening is placed a slightly tapered ring 9 split, as shown, to form a spring and arranged to grip the upper part S of the spindle. Said ring is retained in position by means of a small screw 10, passing through the boss 6, and engaging with a flat face on the outer circumference of such spring. The said spring is further retained in position by a cap 11, which is screwed over the upper portion 7 of boss 6, as shown in section in Fig. 3, such cap having a hole 12 in its center, corresponding in diameter to the diameter of the spindle S. The lower end of the spindle S fits in the hole 12 and is engaged by the spring 9, so that it is practically coupled to the lower or driven portion of the spindle and will revolve with it.

Another device for coupling the lower and upper halves S and S' of the spindle is shown in Figs. 14 and 15, and consists of a collar 37 having through it an opening 38. The lower half S' of the spindle is held in position in the said collar by means of a screw 39, or other convenient means. A spring 40 is attached to the upper portion of collar 37, in such manner as to act against one end of a pin 41 passing through the said collar into the opening 38. The lower end of the spindle S is provided with a groove which, when the spindle S' is in position, is engaged by the end of pin 41.

The flier M as above described is secured permanently, if desired, to the spindle S, and above the said flier, and by preference attached to the same, is a collar 13, having the threaded tubular extension J whose upper interior edge is rounded off as indicated at J'. An opening 14 communicates with the interior of the boss 13 and end J of the spindle S, and through this passage is passed the thread, as shown in Fig. 3. The cover L is attached to the end J of spindle S, and in order to prevent excessive friction between the base

of said cover and the bearings K in the top of bar C, a flange J² is formed immediately below the threaded part of spindle S.

It will be readily understood that the cover L revolves with the spindle S, so that the thread thus passes through a constantly revolving passage or eyelet instead of through a fixed one as hitherto usually employed, and, as a consequence, the wear and tear experienced on the fixed eyelets as used hitherto is reduced to a minimum, while the wearing away at one place of said revolving eyelet is obviated.

In order to rapidly pass the thread through the eyelet J' and aperture 14, I use a curved instrument, such as 34, (Fig. 13) provided with a hook 35. Under operating conditions this is passed through J', and through aperture 14, and the thread drawn upwards, or pushed downwards, as desired.

Towards the base of the frame and across the front thereof is a bar 15, mounted on two arms bolted to and projecting from said frame and these carry at a slight angle, as shown in Figs. 1, 2 and 8, a number of short pegs 16 on auxiliary spindles, one opposite each spindle S for the reception of the spools when these have been removed from said spindles. Wire bars or frames 17 and 18, of suitable size and configuration, are supported from each end of the said bar 15 and for a purpose hereafter described.

Mounted in front of the spindles, slightly above and to the rear of the bar 15, is another bar 19 to which is attached at intervals one portion or blade 20 of a number of pairs of scissors, which blade is set at an angle, as shown in Fig. 1. Another blade 21 is attached or fulcrumed to each of the blades 20, Fig. 8, and all of these blades 21 are connected to a bar 22 capable of sliding in such a manner that when a handle 23 on said bar is pushed inwardly, the blades close like an ordinary pair of scissors. These scissors or cutters act in conjunction with the before mentioned bars or frames 17 and 18 which have for their object the pressing down and placing of a slight tension on the thread when this is to be cut.

Mounted on brackets carried from the upper portion of the frame by any desired structure (not shown) are arms 25, (Figs. 2, 6 and 7) having pivoted to them arms 28 which support a shaft or bar 26, which in turn carries short pegs 27 forming a second set of auxiliary spindles corresponding in number and position to spindles S. Said bar may be turned by means of the lever or handle 28.

Mounted on the bar 26 by any convenient means are hinges 29, carrying a plate 30, having portions 31 cut away, as shown in Fig. 7, in such a manner that when the said plate 30 is turned towards the pegs or auxiliary spindles 27, should any spool holder N' be in position on said pegs, as shown in dotted lines in Fig. 6, the same will be held by such plate 30 until the latter is raised. In order to prevent the said plate from resuming its original or open position as would be the tendency should the bar 26 be turned over, a catch 32 is provided which engages with plate 30, and retains it in the closed or down position as long as it is desired.

A stop or stops 33 are provided on arm or arms 25 for restricting the travel or turning movement of bar 26, and determining the angle at which the said bar, and

also pegs 27, shall rest when turned over. For this purpose said stop extends downwardly from the arms 25 so as to be engaged by the bar 26 when this has been properly actuated by its lever or handle 28, as shown in Fig. 2.

Between the lifter bar A and the spool holders N' are placed a suitable number of washers 1, such washers forming a yielding bearing for the base of said spool holders N', and being retained in position on the "doffing" of the spools by the plate or plates Z.

The operations which take place with my improvement are as follows:—When the spools N are full and require "doffing" the lifter bar A, is first lowered in the ordinary manner. The washer holder or plate Z is placed in position against the washers 1 by means of a handle Z², Fig. 1. The plate or plates W, hereinafter called the spindle steadiers, are operated by means of a handle V towards the spindles S, the cut out portions W' partially surrounding the spools N. The needles or spikes Y are then turned towards the spools N and the points pressed into same, thus holding the said spools in position on the spindles. The bar C and spindles S are lifted by means of lever D, leaving the cup 11, and boss 6 on spindle S'. The hand lever O is then operated and the bar C and spindle S turned outwards, so as to permit the pin P² being inserted in apertures P' and O', thereby holding the respective spindles so that they are in line with the auxiliary spindles 16. The spikes Y (which now only hold up the full spools N) are now moved to release said spools, which drop on to said auxiliary spindles 16. The empty spindles S are then turned upwards by means of the before mentioned lever O, which is operated to the full extent of same, and held in its extreme position so as to bring the said spindles at the desired angle. The bar 26, carrying the second set of auxiliary spindles or lugs 27, with the empty spools and spool holders N' (the spool retainer 30 being in the down position) is then turned over by means of handle or lever 28, until such handle is in contact with the stop 33. The auxiliary spindles 27 being now at the same angle as, and respectively in line with, the spindles S, the spool retainer 30 is raised, and the empty spools N' drop on to the spindles S, the steadier W preventing the spools from falling off the spindles, as they are returned to their original position. The spindles S are then turned back into the vertical position, after which they are lowered into the cup 11 and bosses 6, so as to again form one spindle by being united with spindle S'. The washer holder Z is put out of operation and the spindle steadier W returned to its original position, allowing the spools and holders N' to drop on to the washers 1. The thread of the full tubes or spools N is turned a little round the empty spools on spindles S, by turning the driving drums of the frame by means of a suitable handle, and the before mentioned wire bars on frames 17 and 18 are placed as shown by dotted lines in Fig. 8, so that the latter presses the thread against a piece of felt 36 provided for the purpose. This arrangement of the said bars 17 and 18 enables a certain amount of tension to be placed on the threads, which are thus pressed down between the blades 20 and 21 of the scissors as shown. The bar 22 is then pushed inwardly by means of the handle 23 and the thread is cut, after which the frame may be started in the ordinary manner.

I claim as my invention:

1. The combination of a frame, a spool-carrying spindle, revoluble means for supporting the spindle on the frame, a device for turning said supporting means to move the spindle in a substantially vertical plane, an auxiliary spindle supported in a line included in said plane and capable of receiving a full spool from the first spindle, with a second auxiliary spindle also supported in a line lying in the plane of the first spindle for delivering an empty spool to said spindle, substantially as described.
2. The combination of a frame, a series of spool-carrying spindles, a structure on a substantially horizontal axis for supporting the spindles on the frame, a device for turning said structure to cause the spindles to move in substantially vertical planes, a set of auxiliary spindles for receiving full spools from the first spindles, and a second set of auxiliary spindles placed to deliver empty spools to the first spindle, one spindle of each auxiliary set being supported so as to extend in lines respectively included in the planes of movement of the movable spindles, substantially as described.
3. The combination of a frame, a series of spindles mounted thereon and each formed in a plurality of separable parts, a revoluble structure for supporting one part of all the spindles, and a device for turning said structure to move the portions of the spindles carried thereby in substantially vertical planes, with means for holding full spools on said spindle portions when the latter are turned from their normal position, substantially as described.
4. The combination of a frame, a structure supported thereon revoluble on a horizontal axis, means for turning said structure on said axis, a series of two-part spindles each having one part carried on said revoluble structure, means for respectively coupling the parts of the spindles, a series of auxiliary spindles supported so as to be respectively in line with said other spindles when these have been turned through predetermined angles and respectively placed to receive full spools from the parts of the spindles attached to the revoluble structure, with means for simultaneously moving said structure to uncouple the respective parts of all the spindles, substantially as described.
5. The combination of a frame, a structure supported thereon revoluble on a horizontal axis, means for turning said structure on said axis, a series of two-part spindles each having one part carried on said revoluble structure, means for respectively coupling the parts of the spindles, a series of auxiliary spindles respectively placed to receive full spools from the parts of the spindles attached to the revoluble structure, with means for vertically moving the revoluble structure to simultaneously uncouple the spindles, and means for simultaneously severing the threads from all the full spools, substantially as described.
6. The combination of a frame, a structure supported thereon so as to be revoluble in a horizontal axis, means for turning said structure on its axis, and means for raising it, a series of spindles carried by said revoluble structure, means for normally retaining the spools on said spindles, other means for engaging the spools to hold them in position when the revoluble structure has been turned to free the spools from said retaining means, and means for receiving full spools after these have been released from the spindles, substantially as described.
7. The combination of a frame, a bar having means for turning it on a horizontal axis and also means for moving it vertically, a series of spindles supported by said bar, a spindle steadier and a spike for each spool, means for operating said steadiers and spikes, with a series of auxiliary spindles respectively placed to receive spools discharged from said spindles, substantially as described.
8. The combination of a frame, a bar having means for turning it on a horizontal axis and also means for moving it vertically, a series of spindles supported by said bar, a spindle steadier and a spike for each spool, means for operating said steadiers and spikes, with a series of auxiliary spindles respectively placed to receive spools discharged from said spindles, each of said spindles being made in two parts detachably coupled together, one of said parts being carried in fixed bearings on the frame, substantially as described.
9. The combination of a frame, a bar thereon having

means for revolving it on a horizontal axis, a series of auxiliary spindles respectively supported above the spindles on the bar and in the same vertical planes therewith, and means for turning said auxiliary spindles about a horizontal axis to bring them in line with the first mentioned spindles, substantially as described.

10. The combination of a frame, a bar carried thereon having means for turning it on a horizontal axis, a series of main spindles carried by the bar, a second revoluble bar, a series of auxiliary spindles carried thereby respectively extending in the same vertical planes as the main spindles, means for turning said second bar on its axis, and means for temporarily retaining spools on said auxiliary spindles while their supporting bar is being turned, substantially as described.

11. The combination of a frame, a bar thereon having means for revolving it on a horizontal axis and moving it vertically, a series of two-part spindles each having one part carried by said bar, two series of auxiliary spindles so placed that one of each series extends in a vertical plane including one of the main spindles, means for revolubly supporting one of the sets of auxiliary spindles above the main spindles, means for temporarily retaining full spools on the main spindles when these have been moved from their normal position, and means for temporarily retaining

empty spools on the second set of auxiliary spindles while these are being brought into line with the main spindles, substantially as described.

12. The combination of a frame, a bar thereon having means for revolving it on a horizontal axis and moving it vertically, a series of two-part spindles each having one part carried by said bar, two series of auxiliary spindles so placed that one of each series extends in a vertical plane including one of the main spindles, means for revolubly supporting one of the sets of auxiliary spindles above the main spindles, means for temporarily retaining full spools on the main spindles when these have been moved from their normal position, means for temporarily retaining empty spools on the second set of auxiliary spindles while these are being brought into line with the main spindles, with means for retaining the main spindles respectively in line with either set of auxiliary spindles, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

W. H. ARNOLD-FORSTER.

Witnesses:

CLIVE WAUGH,
JOSEPH P. KIRBY.