# United States Patent [19]

**Brichta et al.**

[11] **3,740,798**

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[54] **APPARATUS FOR MOUNTING CARRIER ARMS IN SPINNING MACHINES**


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[51] **Int. Cl.** ..... **D01h 5/46**

[58] **Field of Search** ..... 19/266, 267, 268, 19/272, 295



[56] **References Cited**

UNITED STATES PATENTS

2,958,103 11/1960 Schrotz ..... 19/266

FOREIGN PATENTS OR APPLICATIONS

923,549 4/1963 Great Britain ..... 19/295



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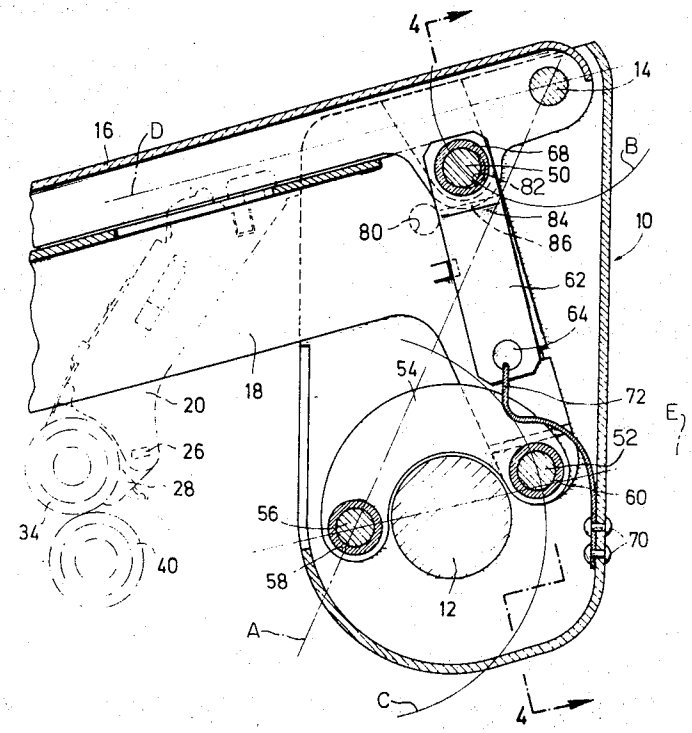
[57] **ABSTRACT**

The top roller carrier for spinning yarn is mounted within a support and a lever is pivoted at one end to the support. The carrier is pivoted at a first point to the lever, and at a second point to the support. The lever is adapted to raise and lower the arm so that the pivot points move in arcuate paths, into closed and open positions.


**10 Claims, 8 Drawing Figures**



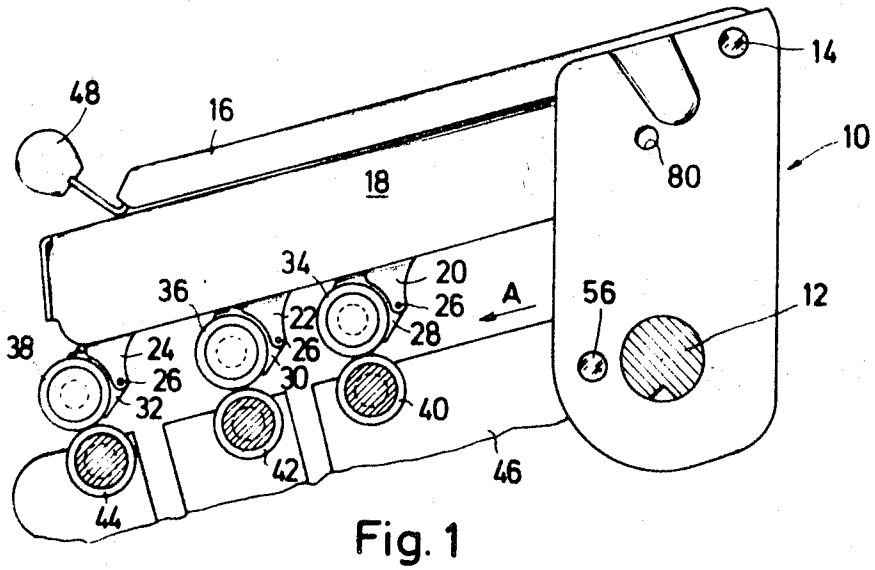



Fig. 1

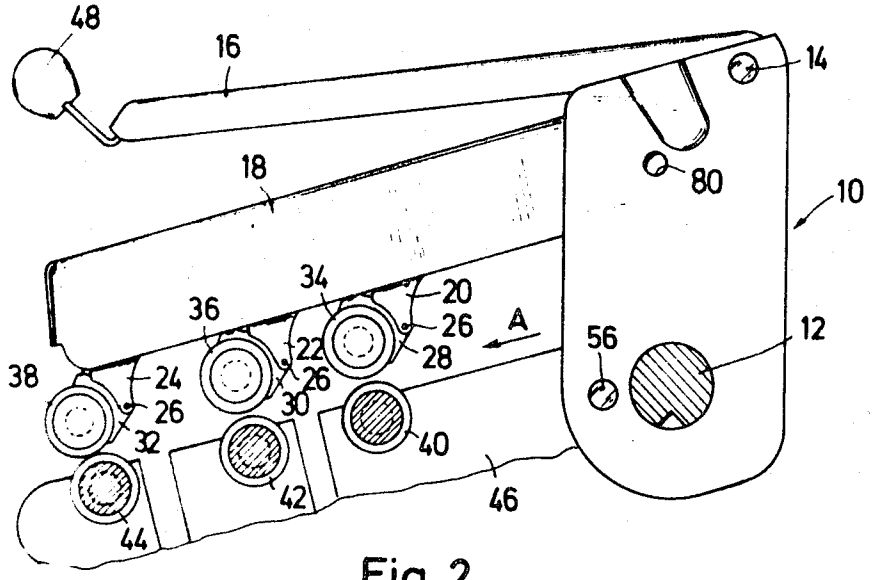



Fig. 2

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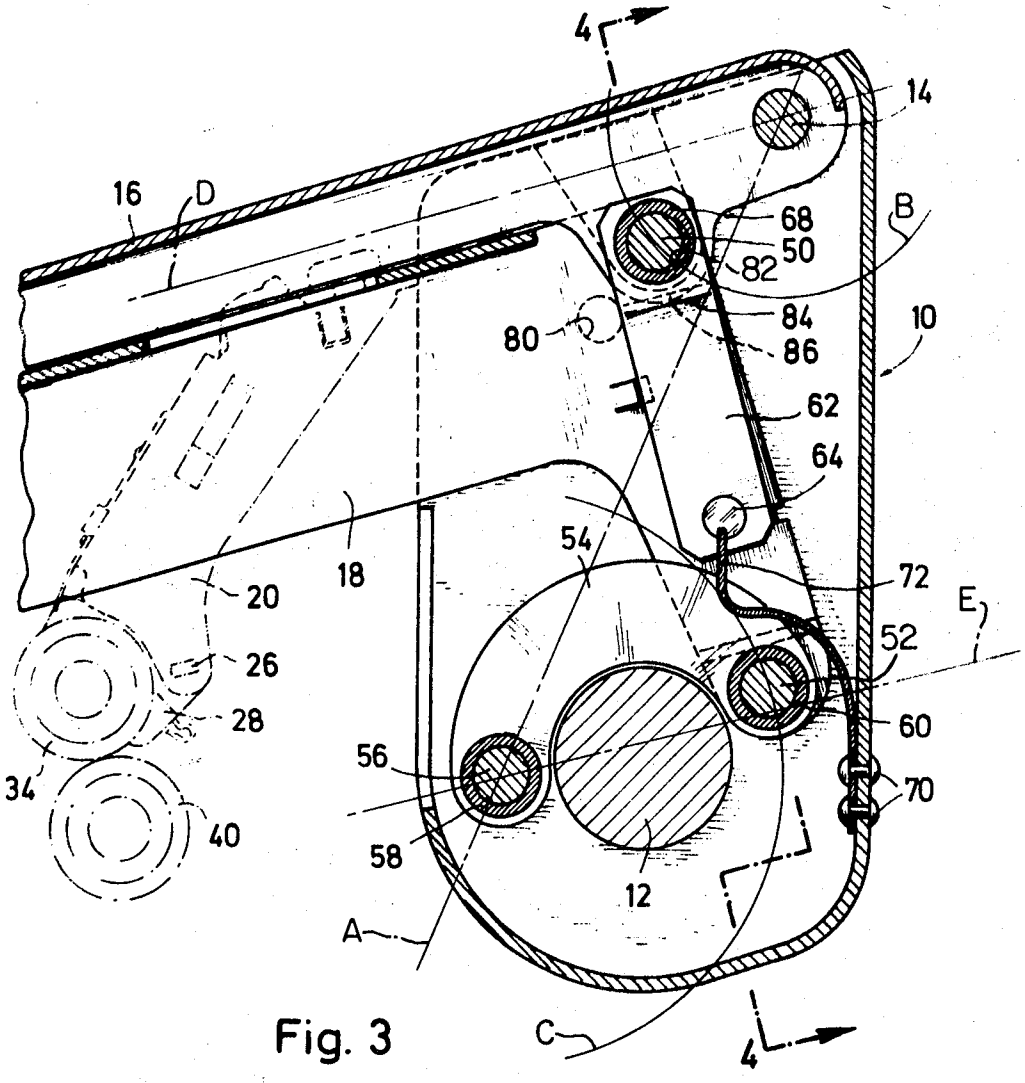


Fig. 3

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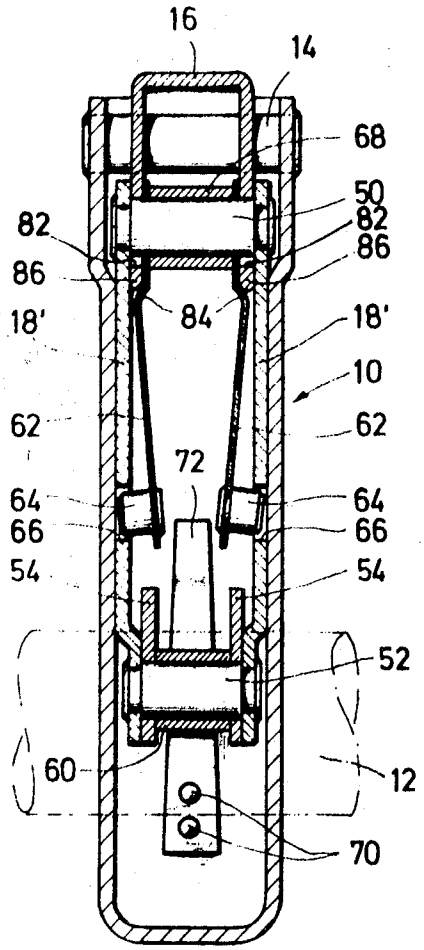
Fig. 4

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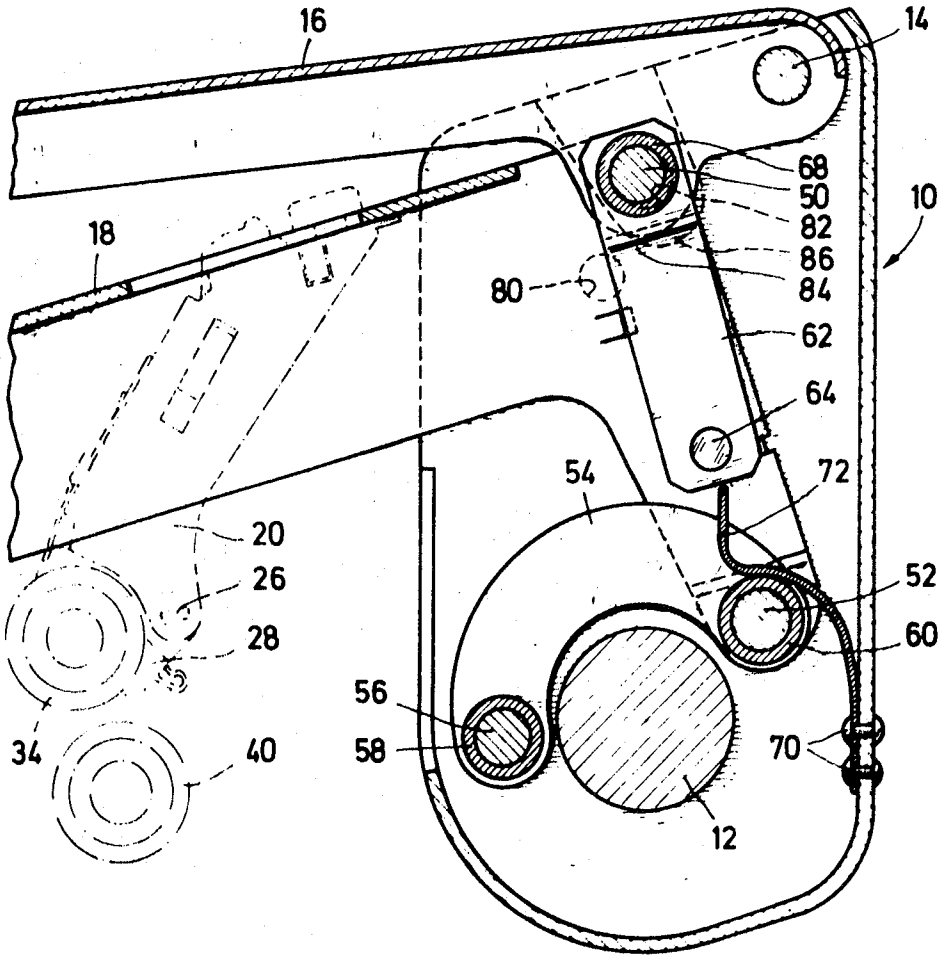


Fig. 5

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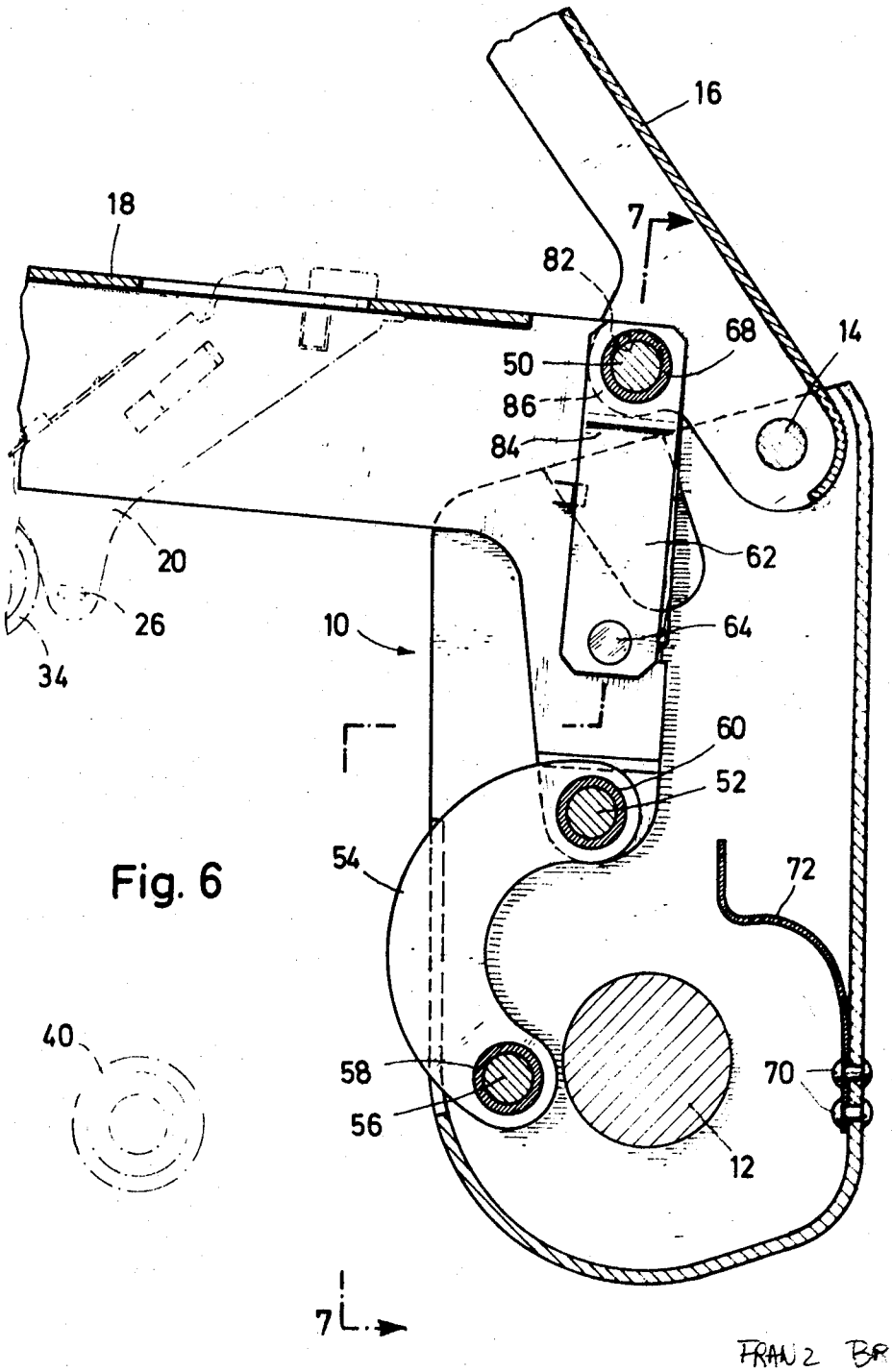


Fig. 6

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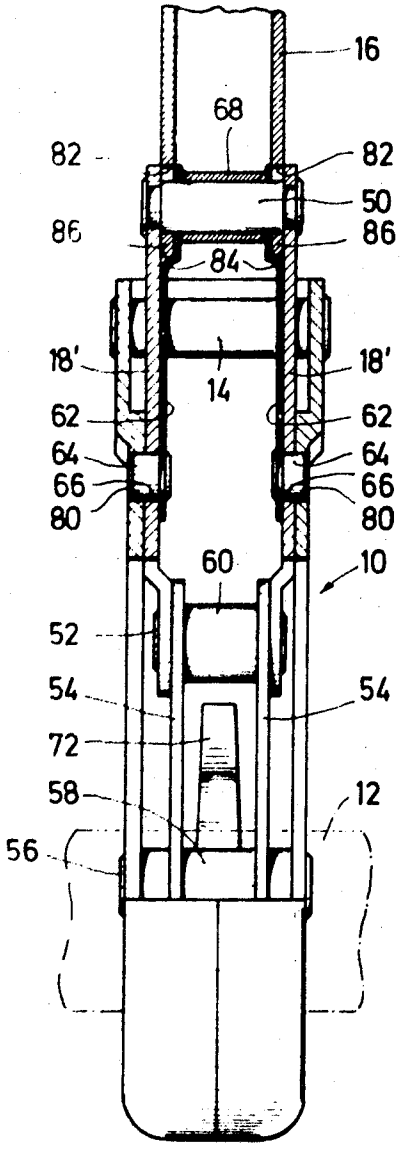


Fig. 7

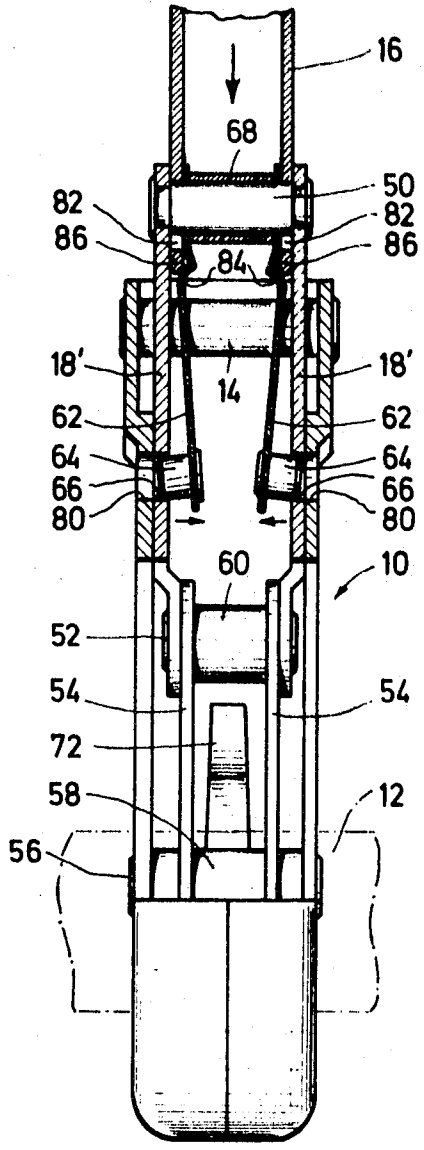


Fig. 8

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# APPARATUS FOR MOUNTING CARRIER ARMS IN SPINNING MACHINES

## BACKGROUND OF INVENTION

The present invention relates to apparatus for mounting carriers of top rollers in the drawing mechanism of a spinning machine.

Carrier arms of conventional drawing mechanisms are shown in German Pat. No. 1,088,850 and U. S. Pat. No. 3,212,139 to which reference can be made. In such devices a carrier arm is arranged with a plurality of supports mounting at their ends top rollers which are adapted to engage respective associated bottom rollers to form the drawing plane for twisting of sliver fibers. The carrier arm extends with a rectangular open or U-shaped housing support and is pivoted about a pin secured in a straight slot formed in the latter walls of the housing support. The carrier arm is linked to an operating lever which has its end mounted about a pin located in the housing support above that of the carrier arm. The lever is guided, however, in an arcuate slot so that it may be raised and lowered to carry with it the carrier arm. The shape and inclination of the two slots must be chosen so that when the lever and carrier are unlocked or opened the upward movement of lever and carrier arm does not cause the top rollers to roll or have a translatory movement relative to the associated rollers. This is necessary to minimize disturbance of the sliver fibers located therebetween. Simultaneously, however, the forwardmost top roller (in the direction of fiber movement) must initially remain in contact with its roller, so that the already spun fibers are not prematurely released and the twist lost. On closing the mechanism, i.e. on downward movement of the lever and carrier arm, the upper rollers must first rest without pressure on the lower rollers for the same reasons. The actual loading or locking of the carrier arm in operative position must thereafter be accomplished by forcibly depressing the lever. Under the high loading forces currently employed for special fibers this last step requires substantial force. A disadvantage of this conventional construction lies in the fact that the geometrical construction, the upward movement of the lever and of the carrier superinposes a certain arcuate movement on a certain translatory movement. Another disadvantage is that the construction is not wholly successful in obtaining the relative motions between the rollers required for good operation. Furthermore, the forces required to insure perfect locking are considerable and often hinder smooth operation.

It is the object of the present invention to provide apparatus for mounting carrier arms which overcome the problems of the prior art.

It is another object of the present invention to provide apparatus for mounting carrier arms which do not require excessive force for their closing and which may be more securely guided during its movement. In particular, it is an object to provide an over-the-center linkage system which insures proper closing operation.

It is another object of the present invention to provide apparatus for mounting carrier arms in which the carrier arm may be moved as an integral part of a linkage system and wherein a particular point on the carrier arm may be employed to define the required path of travel.

It is yet another object to provide apparatus for mounting carrier arms in which means are provided for the partial opening of the drawing mechanism and which also provides means for locking the carrier arm and lever in open position.



These objects, numerous others, as well as numerous advantages will be obvious from the following description.

## SUMMARY OF INVENTION

According to the present invention apparatus for mounting carrier arms of a drawing mechanism for a spinning machine is provided which comprises a fixed support housing in which the ends of the carrier arm and operating lever is mounted. The lever is pivotally secured to the housing about a fixed pin while the carrier arm is pivoted at one point to the lever and at another to the housing so as to provide an arcuate path of travel for the pivot points on raising or lowering of the lever.

Preferably the pivot points are arranged in an array in which the pivot link between the carrier and the lever is offset slightly below the pivot pin of the lever and the support and the two pivot points of the carrier arm are located on opposite sides of a line passing through the centers of the arcuate paths.

Further, it is preferred that the carrier comprise a link in a four bar linkage system so that the point of travel of a given top roller is defined.

Various other features such as an over-the-center linkage system, and a locking system are provided.

Full details of the present invention follow herein and can be seen from the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a side elevation view of a drawing mechanism, in closed position,

FIG. **2** is a view of the mechanism in partially loaded or open position,

FIG. **3** is a side section in enlarged form of the carrier arm and support shown in FIG. **1**,

FIG. **4** is a sectional view taken along line **4—4** of FIG. **3**,

FIG. **5** is a view similar to FIG. **3** showing the mechanism in partial open position, as in FIG. **2**,

FIG. **6** is a view of the mechanism fully opened and in locked position, and

FIGS. **7** and **8** are sectional views taken along line **7—7** of FIG. **6** showing the locking arrangement in closed and open positions respectively.

## DESCRIPTION OF INVENTION

FIG. **1** shows a stationary housing support **10** which is normally fixed to the machine frame. A holding rod **12** extends through the housing **10** and holds a multiplicity of carrier arms **18** on which are arranged the rollers of a drawing mechanism of a spinning machine. Each carrier arm **18** is mounted separately. A pin **14** is mounted in housing **10** and holds an operating lever **16** for each carrier arm **18.** The end of the carrier arm **18** (to the right in FIG. **1**) is also received and supported in the housing **10,** and has depending walls **18'**.

The carrier **18** supports a plurality of top roller supporting mounts **20, 22** and **24.** Each supporting mount has a link **28, 30** and **32** respectively pivoted counterclockwise about a pin **26.** The links each have a saddle in which the top roller is resiliently held by a spring (FIG. **3**). A preferred structure for the top roller sup-

ports is shown and fully described in co-pending application of the assignee hereto of Franz Fuchs, Ser. No. 120,535 based upon German application P 20 10 104.6 filed Mar. 4, 1970, to which reference for details can be made.

Each top roller is opposed by a bottom roller **40, 42** and **44** respectively, which are themselves rotatably journalled in a stationary arm **46.** In this form the drawing mechanism appears as a conventional three roller device (in which belts may be incorporated) defining a common tangential plane between the rollers through which fibers, slivers or the like are moved in the direction of arrow A and spun in conventional manner.

The structural details of the carrier supporting assembly can be seen in FIG. **3.** In this figure the rear end only of the lever **16** and upper carrier **18** is shown and the rearmost support arm **20** and associated rollers **34** and **40** are indicated in dotted lines. It will be obvious that both the lever **16** and the carrier arm **18** are of reverse U-shaped cross section. The carrier arm **18** is pivotally mounted at its upper end about a pin **50** which is secured in the lever **16** and at its lower end by means of a second pin **52** to a pair of arcuate levers **54** which itself is pivotally secured at its arcuate other end to the support housing **10** by means of a fixed bolt **56.** As will be seen from FIGS. **4** and **8,** the entire apparatus is symmetrical to a median plane and the two lugs **54** are identical, being joined at their ends by sleeve **58** and sleeve **60** located about the pins **56** and **52** respectively. The levers **54** are shaped in such a manner that they rest on the supporting rod **12** when the carrier arm **18** is placed in the operating position, as illustrated in FIG. **3.**

Furthermore, two leaf springs **62** are fastened at one end about the pivot **50** of the carrier arm **18.** The free ends of the leaf springs **62** carry laterally extending pins **64.** In the lateral walls **18'** (FIG. **4**) of the carrier arm there are provided openings **66** through which each of the pins **64** are adapted to seat. The pins **64** and springs **62** move with the carrier arm. The pins **64** are normally biased to ride against the inner surface of the support **10** under the action of the leaf springs **62** when the carrier is in the operation position (FIG. **3**) and when the carrier is moved through all other positions with the exception of the upper terminal or locked position when it seats with a hole **80** bored into the wall of housing **10** as will be hereinafter described. The leaf springs are freely mounted on the pin **50** and are separated by a sleeve **68** surrounding the pin.

As is illustrated, in FIG. **3,** an approximately S-shaped flexible torsion leaf spring **72** is attached to the rear wall of the housing **10** by means of two rivets **70.** The spring **72** extends into contact and cooperates with the pin **52** or its sleeve **60** to resiliently load the linkages connecting the pivots **14, 50, 52** and **56** when the lever **16** is initially partially pivoted as will hereinafter be explained so that the carrier arm is predisposed into its closed and operating position.

When the operating lever **16** is initially pivoted by means of the handle **48** from the positions shown in FIGS. **1** and **3,** the pins **50** and **52** are guided along circular arcs which initially cause the top rollers **34** and **36** to be lifted from the lower rollers **40** and **42** (FIG. **2**). The mechanism thus assumes a partially loaded (partially unloaded) position where only the top roller **38** continues to rest upon its associated lower roller **44.** Simultaneously the carrier arm **18** is shifted in the direction of arrow A (FIG. **1**) through the action of the four bar system defined by the pivot points **14, 50, 52** and **56** and their connecting elements. The connecting elements are so dimensioned that the pivoting component of the top roller **38** about its pivot pin **26** in a direction opposite to the arrow A (FIG. **1**) is nil during this initial stage and is compensated for so that the point of contact between the top roller **38** and its associated lower roller **44** is not moved. This condition exists until the partial unload position of the rollers **32** and **34** is reached, as illustrated in FIGS. **2** and **5.**

When the operating lever **16** is pivoted upward from the position shown in FIGS. **1** and **3** to the position shown in FIGS. **2** and **5,** the pins **50** and **52** are caused to move along a circular path the center of which lies remote from the pins and in the direction of the top and bottom rollers of the drawing mechanism. The radius of the arcuate path is relatively large although the circular motion is evident even with the small movements required. On initial operation the pin **52** and its sleeve **60** are caused to abut against the torsion spring **72,** as best seen in FIG. **5.** By chosing the rate of torsion spring **72** at a predefined level so that on its contact with the pin **52** and its sleeve **60** the torque exerted by it is balanced with the torque exerted by the spring which biases the roller **38,** the initial partial loading position described above and shown in FIG. **5,** can be readily defined and determined. Generally, the drawing mechanism is arranged so that during drawing operation the top rollers **32, 34** and **38** rest upon their associated rollers with a force approximating 30 $K_p$. In the partial load position, however, the roller **38** is caused to rest on the roller **44** with a force of only 5 $K_p$ this being obtained by balancing the torques of the springs and the linkage system described. A partial loading position is necessary in order to prevent the deformation of the roller bodies when the operation of the mechanism is temporarily stopped. Otherwise the large static pressure of the rollers against each other would distort their circular cross section. At the same time a partial loading is required at least for one roller, in order to hold the fiber sliver in place and to prevent run through of the fiber and to avoid the loss of the twist.

When the operating lever **16** is thereafter pivoted still further upwardly (clockwise) the pin **52** is further arcuately pivoted to displace the torsion spring **72** toward its fixed side. The roller **38** is then lifted completely from contact with its lower roller **44.** Simultaneously, the pins **64** which normally ride within holes **66** come within range of the openings **80** formed in the lateral walls of the housing **10.** Finally, as the holes **66** align with the openings **80** the pins **64** pass into the openings **80** and thereby lock and hold the lever **16** and carrier arm **18** in open position, as shown in FIGS. **6** and **7.**

The device is released from locked position by the downward movement of the operating lever **16.** This last figure (FIG. **7**) also shows that the pin **50** passes through an elongated slot **82** in the operating lever **16** which is also shown in FIG. **3.** This arrangement provides sufficient lost motion between the carrier and the lever so that even on continued upward movement of the lever, beyond the locking position, the lock is not released and the carrier is not moved either. The locking mechanism thus functions automatically when holes **66** and **80** are aligned. The two leaf springs **62** are offset below their points of attachment with the pin **50,** forming a shoulder or bend **84.** This prevents the car-

rier arm **18** from being moved during the initial portion of the downward movement of the operating lever **16** and the pins **64** remain in holes **80.** The lower marginal areas or edges **86** of the lever **16,** seen in FIGS. **7** and **8,** serve as unlocking elements for the leaf springs **62.** The edges **86** engage with the shoulders **84** of the leaf springs and with the application of a small degree of force cause the springs to recede and remove the pins **64** from the holes **80.** Thereafter, on application of continued force, the carrier arm **18** and the lever **16** can be moved downwardly from the position of FIG. **6** to that of FIG. **3** and until the top rollers abut against the lower rollers so that the forces of reaction of the latter exert a torque on the pin **50** relative to the pin **14** in a counter-clockwise direction. This torque is exerted when the pin **50,** the longitudinal axis of carrier arm and the pivot pin **14** are aligned so that a straight line runs in a downwardly direction substantially through the center of each. At this point the reaction forces of the lower rollers **40 – 44** automatically exert sufficient pressure to close the lever and carrier arm so that the upper rollers are pressed against the lower rollers until the arcuate levers **54** abut against the holding shaft **12.** During the downward movement the pin **52** deflects the torsion spring **72** to the right because of its doubly curved form.

As will be seen from an analysis of the geometry of the disclosed mechanism that in the closed or operating position the two pivot points **50** and **52** be located on opposite sides of a connecting line A between the centers **14** and **56** respectively of two arcuate paths B and C in which they travel and that the upper pivot **50** is offset from and is located only slightly below or adjacent a line D passing through the pivot point **14** connecting the operating lever, and parallel to the elongation of the carrier arm. It is also to be seen that the lower pivot point **52** is located approximately on a line E which runs parallel to the direction of elongation of the carrier arm and through the center of its arcuate path. Thus the carrier arm **18** constitutes an element of a four bar linkage system which precisely defines a path of predetermined direction for a point on the carrier arm. By suitable arrangement this condition can be obtained, for example, with respect to the center of the rearmost top roller **34** the arrangement can be constructed so that the roller **34** is lifted from the bottom roller **40** without any rolling or translatory movement.

It will thus be seen that the carrier arm is mounted to pivot about two points, both of which are located on the bottom of the carrier arm or facing the top rollers and both of which move in their own arcuate or circular paths. An advantage of this construction is that very small forces are required to pivot the carrier arm into and out of operating position.

By arranging the first of the pivot points **50** as the connecting link between it and the operating lever special buide elements and complex constructions are avoided. By spacing this pivot point from the pivot axis **14** of the operating lever the magnitude of the compensating movement of the carrier arm may then be determined in a simple manner, provided that the pivot point does not shift radially of the circular path. This also prevents the axial translation, or rolling of the top and lower rollers with respect to each other, on lifting of the carrier arm.

The arcuate lever **54** by which the second carrier arm pivot point **52** is guided also has great advantage. The abutment of this member against the necessary holding rod **12** provides a simple stop mechanism. It will be appreciated, however, that the lever **54** can be replaced by a pin or key arm extending from the end of the carrier arm, which pin or arm could ride within a slot or keyway of arcuate shape formed or mounted on the housing wall. The same may be mounted directly on the holding rod. The described linkage system has still another advantage, in that it provides a so-called over-the-center crank by which it is possible to pass through a particular point in the path of movement, after which the carrier arm becomes automatically closable by the operation of the forces of reaction of the lower rollers. This insures that the carrier arm will securely close when the operating lever is depressed for this intention. To this end it is also helpful that the two pivot points are located on opposite sides of a line passing through their arcuate path centers and to locate the pivot connection of the carrier arm with the operating lever only slightly below a line through the pivot point of the operating lever and parallel to the elongation of the arm. This supplies the necessary arrangement so that the over-the-center point is associated with a position of the operating lever in which the latter forms only a relatively small angle with the carrier arm. Simultaneously, a relatively large compensating movement of the carrier arm is obtained.

The present arrangement also provides a simple arrangement for obtaining a partial loading position. This is achieved by locating the pivot point **52** approximately in or contiguously adjacent a line parallel to the carrier arm and passing through the center of its arcuate path. A great difference in the lifting of the rear and of the frontmost upper rollers is obtained (i.e. the rearmost portion of the carrier passes through a greater movement or distance). It is to be understood, however, that the pivot point **50** of the carrier arm must not be located below the pivot axis of the point **14** of the lever **18.** The S-shaped spring **72** insures that the forward most roller **38** maintain contact with the associated roller **44** to hold the yarn. By its pressing against the pivot point **52** the spring **72** urges the carrier arm always into closed position.

The jointly movable leaf springs **62** with pins **64** provide a very simple and effective locking means.

It is thus seen that the present structure is very simple, it does not require excessive expensive parts and may be easily constructed. Various modifications have been indicated. Others will be obvious to those skilled in this art. It is therefore, intended that the present description be taken as being illustrative only.

What is claimed is:

**1.** Apparatus for mounting the top roller carriers of a drawing mechanism for a spinning machine comprising

a fixed support housing,

an operating lever pivoted at one end to said housing,

a carrier arm having one end mounted with said housing and having a plurality of top rollers arranged along its length,

means for pivotally connecting said one end of said carrier arm at a first pivot point to said operating lever, and

movable means for linking said one end of said carrier arm at a second pivot point to said housing,

said pivot points being movable in arcuate paths on pivoting of said operating lever whereby said car-

rier arm is caused to be lowered or raised into a closed operating position and in open non-operating position respectively.

2. The apparatus according to claim 1 wherein said linking means comprises an arcuate lever secured at one end to said second pivot point and at the other end to said housing.

3. The apparatus according to claim 1 wherein in the operating position the two pivot points are located on opposite sides of a connecting line between the centers of the two arcuate paths and the first pivot point is located only slightly below a line passing through the point at which the operating lever and housing are pivoted and parallel to the elongation of the carrier arm.

4. The apparatus according to claim 3 wherein the second pivot point of carrier arm is located in the operating position approximately on a line which runs parallel to the direction of elongation of the carrier arm and through the center of the arcuate path of said second pivot point.

5. The apparatus according to claim 1 including pivot means at said second point comprising a pin, and including resilient means adapted to engage said pin on its upward movement and bias said carrier arm into its operating position.

6. The apparatus according to claim 5 wherein said resilient means comprises an S-shape leaf spring secured to said support housing.

7. The apparatus according to claim 1 including means for locking said lever and said carrier arm in open non-operating position.

8. The apparatus according to claim 7 wherein said locking means comprises a spring having a lateral pin adapted to ride within a hole in said carrier arm, a hole in said support housing, said hole being arranged in alignment in the open non-operating position and said pin being adapted to enter and seat in said hole.

9. The apparatus according to claim 8 wherein means are provided on said operating lever for engaging said locking spring on the downward movement thereof to flex said spring and release said pin from said hole in said support housing.

10. The apparatus according to claim 1 including a lost motion linkage connecting said carrier arm and said operating lever to permit the lever to move through a predefined distance without moving the carrier arm.

* * * * *