

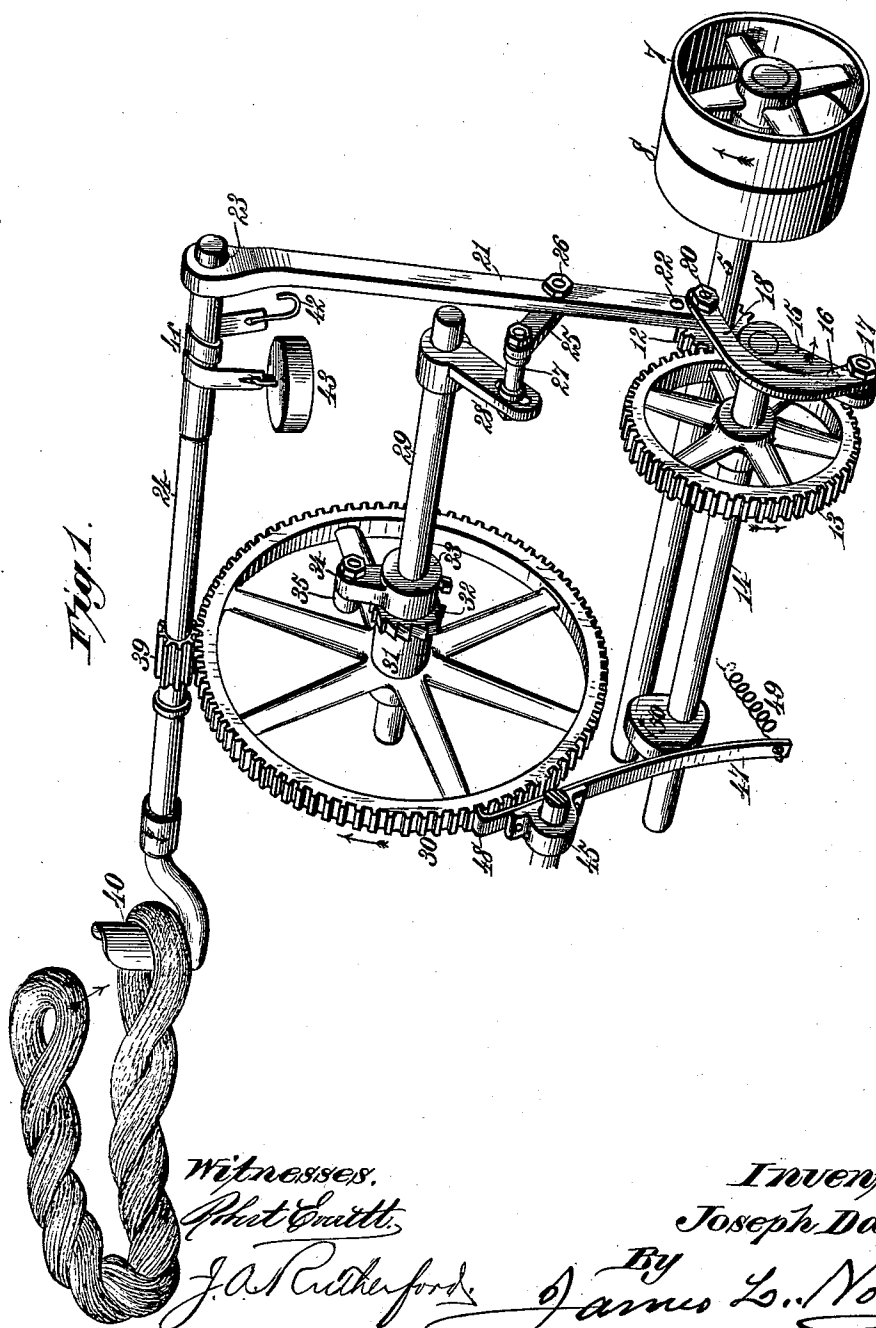
(No Model.)

3 Sheets—Sheet 1.

J. DART.
YARN HANKING MACHINE.

No. 464,430.

Patented Dec. 1, 1891,



Witnesses,

Phet Smith,

J. A. Rutherford.

Inventor:

Joseph Dart.

Bu

By
James L. Norris

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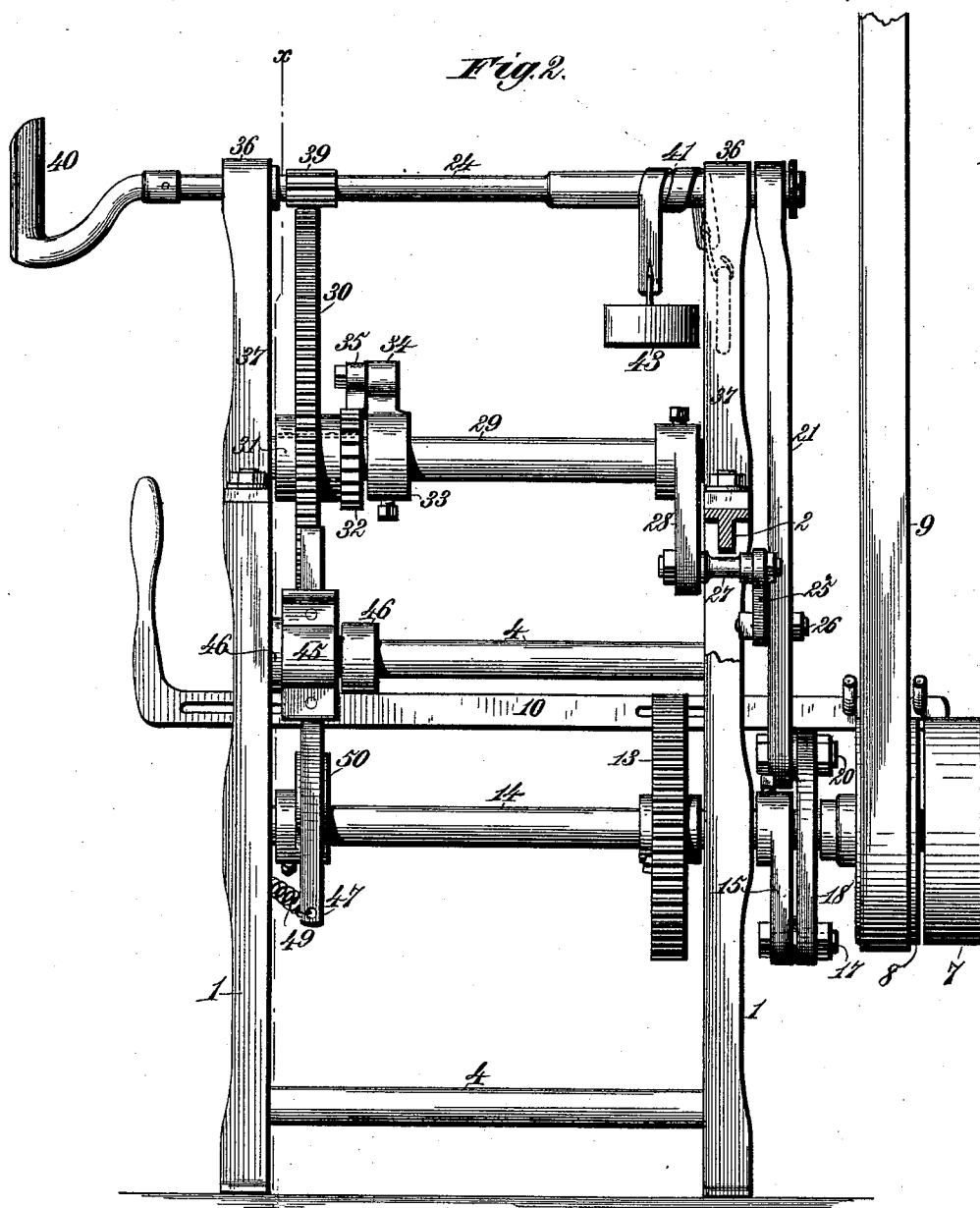
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3 Sheets—Sheet 2.

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Patented Dec. 1, 1891.



Witnesses.
Robert Everett.
J. A. Rutherford.

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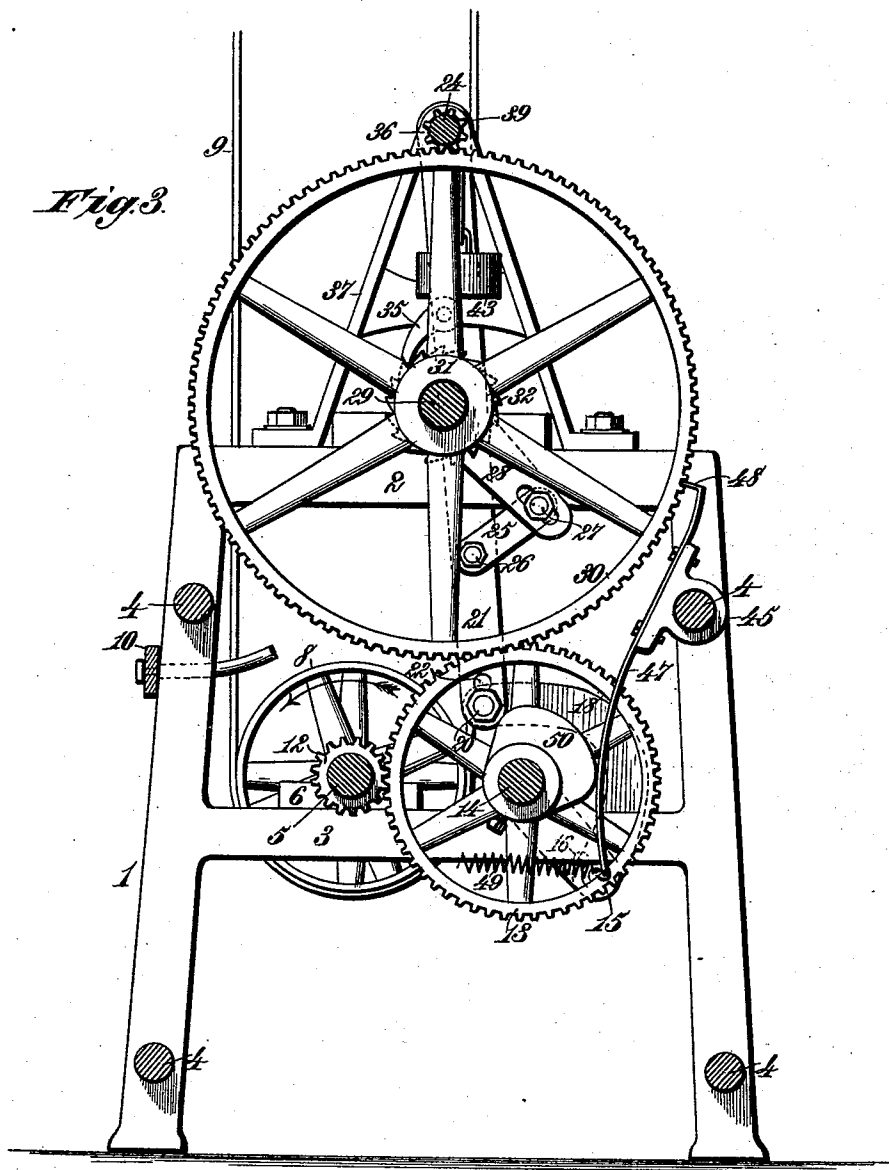
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Inventor:
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UNITED STATES PATENT OFFICE.

JOSEPH DART, OF BROOKLYN, NEW YORK.

YARN-HANKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 464,430, dated December 1, 1891.

Application filed January 15, 1891. Serial No. 377,869. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH DART, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Yarn-Hanking Machines, of which the following is a specification.

My invention relates to machines for twisting and hanking skeins of yarn by imparting a certain number of revolutions to a twisting head or holder, by which one end of the skein is engaged while the other end is held stationary, the two being brought together when the twisting is completed to permit the formation of the reverse twist and enable one end to be passed through a loop in the other and thus secured.

It is the purpose of my invention to provide a novel, simple, and comparatively inexpensive mechanism whereby the difficulties heretofore experienced in hanking yarn shall be avoided, the operation rendered cheaper and more rapid, and the number of operations required by the methods heretofore in use reduced by one-half.

It is my purpose, also, to so construct and organize a machine of this type that its twisting-shaft shall have periodical or intermittent revolution, produced automatically and by positive means, without employing belt-shifting devices, slipping pulleys, or other mechanism, whereby a strain and shock or more or less violence is imposed upon the whole machine.

To these ends my invention consists in the several novel features of construction and new combinations of parts hereinafter fully set forth, and then more particularly defined in claims following this specification.

To enable others skilled in the art to make, construct, and use said invention, I will proceed to describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of a mechanism embodying my invention, the frame and the bearings supporting the several parts being removed or omitted for the purpose of affording clearer illustration. Fig. 2 is a side elevation of the entire machine. Fig. 3 is a sectional elevation of the front end of the ma-

chine, the section being taken upon the line *x x*, Fig. 2.

In the said drawings, the reference-numeral 1 indicates the uprights or legs at each end of the machine, forming part of the frame and connected at their upper extremities by horizontal beams 2, while intermediate of the upper and lower ends are horizontal beams 3, the front and rear sections of the frame being connected by tie-rods 4.

The numeral 5 designates the power-shaft of the machine, which is supported in suitable bearings 6, mounted on the beams 3 and having one end projecting beyond the rearward member of the machine-frame, as shown in Fig. 2. Upon this projecting end are mounted two pulleys 7 and 8, the former being a fast and the latter a loose pulley, the shaft being driven by a belt 9, which is thrown from the tight to the loose pulley, and vice versa, by a belt-shifter 10 of any suitable construction.

Upon the power-shaft 5 is rigidly mounted a small gear 12, meshing with a larger gear 13, which is rigidly mounted upon a counter-shaft 14, having its bearings arranged upon the horizontal beams 3. Upon the end of the counter-shaft which projects beyond the rearward end of the frame is mounted a crank-arm 15, in or near the extremity of which is formed a series of openings 16, Fig. 3, in one of which is placed a bolt 17, forming a pivotal connection for one end of a curved arm or connecting-bar 18. These apertures permit the attachment of the end of the curved arm 18 at different points, whereby the throw or sweep of the other end may be rendered greater or less, as circumstances may require. The end of the curved arm or connecting-bar 18 referred to is pivotally connected by a bolt 20 to a bar 21, provided at one end with a series of openings 22 to permit an adjustment of the bolt 20 corresponding substantially to that of the bolt 17. At the other end of said bar is formed an eye or opening 23, in which the end of a shaft 24 lies, the connection being a loose one in order that the bar may swing or vibrate thereon.

The construction and function of the shaft 24 will be described hereinafter.

I do not limit myself to the particular loca-

tion of the openings 16 and 22, as they may be formed in any of the other parts which bear a similar relation to each other.

At any suitable point between the two ends of the bar 21 a short arm 25 is pivotally mounted, its one end being attached to said bar by a bolt 26, while the other end is connected to the wrist or crank pin 27 of a crank-arm 28, rigidly mounted upon a shaft 29, which is supported in suitable bearings upon the horizontal beams 2 of the frame. Upon this shaft is loosely mounted a spur-wheel 30, of comparatively large diameter and having a hub 31, upon one end of which is formed or attached a ratchet 32. Adjacent to this ratchet and keyed or otherwise secured rigidly to said shaft 29 is an annulus 33, provided with an arm or projection 34, upon which is pivoted a pawl or dog 35, its point engaging with one of the teeth of the ratchet when the annulus and its shaft are turned in one direction and riding over the teeth when an opposite revolution or rotary movement is produced. For example, if a rocking movement is imparted to the shaft 29 a periodical or intermittent movement in the same direction will be given to the gear 30.

The shaft 24, upon the end of which the bar 21 hangs and swings, is mounted in bearings 36 upon uprights 37, which rise from the beams 2 of the machine-frame, said uprights being bolted to the beam 2 at their lower ends. Upon said shaft is mounted or rigidly attached a spur-pinion 39, which meshes with the spur-wheel 30. The end of this shaft projects beyond the outer face of the standard or upright 37 upon the front end of the machine-frame, and at a short distance from said upright it is provided with a twisting-hook 40, fastened upon the shaft in any suitable manner and bent or curved out of the axial line of the shaft, said hook being arranged substantially at right angles with the axis of the shaft and having such length that if the axial line were prolonged it would intersect the central portion of the head, or nearly so.

In order to prevent accidental rotary displacement of the shaft either by its own momentum or by that of the spur-wheel 30, a friction-brake of any suitable character is applied thereto, a simple form of which is shown in the drawings, consisting of a strap 41, having one end attached to a hook 42 upon one of the uprights 37, the strap being then wound one or more times around the shaft and retained in close contact therewith by a weight 43, connected to its free end, as shown in Figs. 1 and 2.

Upon one of the tie-rods 4 and in the same vertical plane with the spur-wheel 30 is mounted a bracket-bearing 45, capable of turning between collars 46 upon the tie-rod 44. To this bracket-bearing is screwed or otherwise attached a lever 47, provided at its upper end with a hook 48, adapted to engage the teeth of the spur-wheel 30 when swung far enough inward. The lower and

elastic end of the lever is acted upon by a spiral spring 49, connected to the frame of the machine and drawing the lower end of the lever constantly inward or toward the power-shaft 5, thereby normally drawing the hook 48 out of engagement with the teeth of the spur-wheel 30.

Upon the counter-shaft 14, in the plane of the lever 47, is a cam 50, which acts upon the lever below the bracket or fulcrum 45, throwing its spring-actuated elastic end outward and holding it during a limited period at the utmost throw of the cam, after which it is released and drawn by the spring 49 inward or toward the counter-shaft, where another period of rest ensues. By these movements the hook 48 is alternately engaged with the toothed edge or periphery of the spur-wheel 30 and held in engagement therewith during a partial rotation of the shaft 14, and then released therefrom during the remaining portion of the complete revolution, thereby holding the spur-wheel 30 motionless for a time and then permitting its rotation. The action of the cam 50 is timed in such manner that it engages the toothed periphery of the spur-wheel at the moment that the active movement or push of the pawl 35 is completed, and disengages and releases the same simultaneously with the cessation of the opposite movement of said pawl, or at the moment it begins to push upon that tooth of the ratchet 32 behind which it drops upon the completion of its receding movement.

The operation of the mechanism is as follows: The skein of yarn being opened, one end thereof is slipped by the hand of the operator upon the hook 40, the other end being held by his other hand, one or more fingers of which are inserted within the free end of the skein, which is subjected to a moderate tension. During the moment occupied by this adjustment the crank-arm 15 on the counter-shaft 14 is passing through a half-revolution below the said shaft, thereby swinging the bar 21 toward the power-shaft, drawing the crank-arm 28 in the same direction and carrying the pawl 35 over the teeth of the ratchet 32 for a successive engagement, the spur-wheel 30, which drives the twisting-shaft 24, being held meantime by the hook 48 of the lever 47. As the bar 21 begins its vibration in the opposite direction the cam 50 releases the lever 47, the spur-wheel 30 revolves, and rotation is imparted to the twisting-shaft 24, a sufficient number of revolutions being given to properly twist the skein. As this movement ceases the hooked end of the lever 47 again arrests the spur-wheel 30 and the bar 21 again swings toward the power-shaft, and during this period of inaction the operator places his hand as near the center of the twisted skein as possible and brings the end held by the other hand into the loop in the skein formed by the hook 40, as shown in Fig. 1. As this hook is composed of a plate curved to present a convex face to the end of the skein

held by it, the other end is brought into or against the concave opposite face of the head and the loop slipped off the latter. By this operation the said loop is drawn over the other end of the skein, thus securely fastening the hank, a reverse twist being formed therein as soon as either end is released. A second skein is then adjusted and the operator proceeds in the manner already described.

By my invention every part of the mechanism is actuated by positive means, the construction is simplified, the number of parts reduced, and the operation expedited and cheapened. I also secure advantages in the operation due to the absence of the severe shock and strain imposed upon mechanism where heavy gearing is suddenly started and stopped. It will be noticed that the vibration or swing of the bar 21, by which the shaft 29 is rocked to impart movement periodically to the gear 30, will be most rapid when the crank-arm 28 reaches a vertical position, and that it will decrease in rapidity as said crank-arm approaches a horizontal position, increasing after passing the latter point in the same ratio. By reason of this fact repeated shock and strain are avoided, the point of the pawl and the teeth of the ratchet are less rapidly worn and not subject to injury, while the hooked lever engages with and arrests the revolution of the spur-wheel 30 without danger of breaking teeth out of the latter or of snapping the hook off the former. This avoidance of sudden or abrupt movement of the twisting-shaft is an advantage, also, in the hanking of light and frail qualities of yarn.

I may substitute for the pawl-and-ratchet connection between the rock-shaft and spur-wheel any suitable form of device which will accomplish the same result—such, for example, as any one of a number of different forms of clutches.

The lower portion of the lever 47 is preferably elastic, in order to avoid the necessity of cutting the cam 50 with such exactness as would otherwise be necessary.

In hanking skeins of yarn of different length it is desirable that the number of revolutions of the twisting-shaft 24 should be increased in number or decreased, as the case may be, to impart substantially the same twist to each length of skein. It is for this purpose that the openings 22 and 16 are formed in the bar 21 and crank-arm 15, respectively. By attaching the connecting-bar 18 at different points upon said crank-arm and bar the throw of both will be diminished or increased, as the case may be, thereby increasing or diminishing the vibration of the short arm 28 and affecting the movement of the spur-wheel 30 in a like manner. The revolutions of the shaft 24 are thus increased or diminished in number in proportion to the variation in point of attachment of the ends of the connecting-bar.

What I claim is—

1. In a yarn-hanking machine, the combi-

nation, with a twisting-shaft having a pinion, of a power-shaft having continuous revolution, a spur-wheel meshed with the pinion on the twisting-shaft, and automatically-operating positive mechanism, substantially as described, between the power-shaft and the shaft of the spur-wheel for automatically imparting to the latter a periodical revolution alternating with a period of rest, substantially as described.

2. In a yarn-hanking machine, the combination, with a twisting-shaft, of a counter-shaft having a crank-arm, a swinging bar connected with and operated by the crank-arm of the counter-shaft, a rock-shaft, connections between the rock-shaft and the swinging bar, a spur-wheel loosely mounted on the rock-shaft and geared to the twisting-shaft, and a positive connection between the rock-shaft and the spur-wheel for giving movement to the latter in one direction of movement of the rock-shaft, substantially as described.

3. In a yarn-hanking machine, the combination, with a twisting-shaft, of a power-shaft a counter-shaft having a crank-arm and geared to the power-shaft, a swinging bar connected with and operated by the crank-arm of the counter-shaft, a rock-shaft carrying a spur-wheel, connections between the rock-shaft and the swinging bar, a pawl-and-ratchet mechanism connecting the rock-shaft with the spur-wheel, a lever having a hook for engaging the spur-wheel, a cam on the counter-shaft for moving the hooked lever into engagement with the spur-wheel, and a spring for disengaging the hooked lever from the spur-wheel, substantially as described.

4. In a yarn-hanking machine, the combination, with a twisting-shaft, of a power-shaft, a rock-shaft having an arm, a counter-shaft having a crank-arm and driven by the power-shaft, a vibrating bar hanging from the twisting-shaft and connected to the crank-arm of the counter-shaft and to the arm of the rock-shaft, a spur-wheel geared to the twisting-shaft and loose on the rock-shaft, and a connection between the latter and the spur-wheel to impart motion in one direction, substantially as described.

5. In a yarn-hanking machine, the combination, with a twisting-shaft having a concavo-convex twisting-head, of a spur-wheel geared to said shaft, a rock-shaft on which said wheel is loosely mounted, a pawl-and-ratchet connection between said wheel and shaft, and means, substantially as described, for rocking said shaft.

6. In a yarn-hanking machine, the combination, with a twisting-shaft having a curved or bent end provided with a head having a concave and convex face, of a rock-shaft having an arm, a spur-wheel loose on the rock-shaft and geared to the twisting-shaft, a pawl-and-ratchet mechanism connecting the rock-shaft with the spur-wheel to impart motion in one direction, a counter-shaft having a crank-arm, a swinging bar connected with the arm

of the rock-shaft, a curved arm connecting the crank-arm of the counter-shaft with the swinging bar, a power-shaft geared to the counter-shaft, a hooked lever for engaging the spur-wheel, a cam on the counter-shaft for moving the hooked lever into engagement with the spur-wheel, and a spring for disengaging the hooked lever from the spur-wheel, substantially as described.

7. In a yarn-hanking machine, the combination, with a twisting-shaft for receiving and holding the end of the skein, of a spur-wheel driving said twisting-shaft, a rock-shaft on which the spur-wheel is loosely mounted, devices for positively connecting the rock-shaft with the spur-wheel at alternate movements of the rock-shaft, a swinging bar, connections between the swinging bar and rock-shaft, a counter-shaft having a crank-arm, a connection between the crank-arm of the counter-shaft and the swinging bar, and means for rotating the counter-shaft, substantially as described.

8. In a yarn-hanking machine, the combination, with a twisting-shaft and a power-shaft

5, of a counter-shaft 14, geared therewith and having a crank-arm 15, a curved connecting-bar 18, adjustably pivoted at one end to said crank-arm, a bar 21, suspended at one end from the twisting-shaft and having an adjustable connection at or near the other end to the connecting-bar 18, a rock-shaft 29, having an arm 28, connected by a wrist and a pivotally-attached bar 25 to the intermediate portion of the bar 21, a spur-wheel 30, loose on the rock-shaft and having a ratchet engaged in one direction by a pawl carried by the rock-shaft, and a lever having a hooked end to engage the spur-wheel and an elastic portion below its fulcrum drawn against a cam on the counter-shaft by a spring, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in the presence of the two subscribing witnesses.

JOSEPH DART. [L. s.]

Witnesses:

D. L. JENNINGS,
J. H. SLOAN.