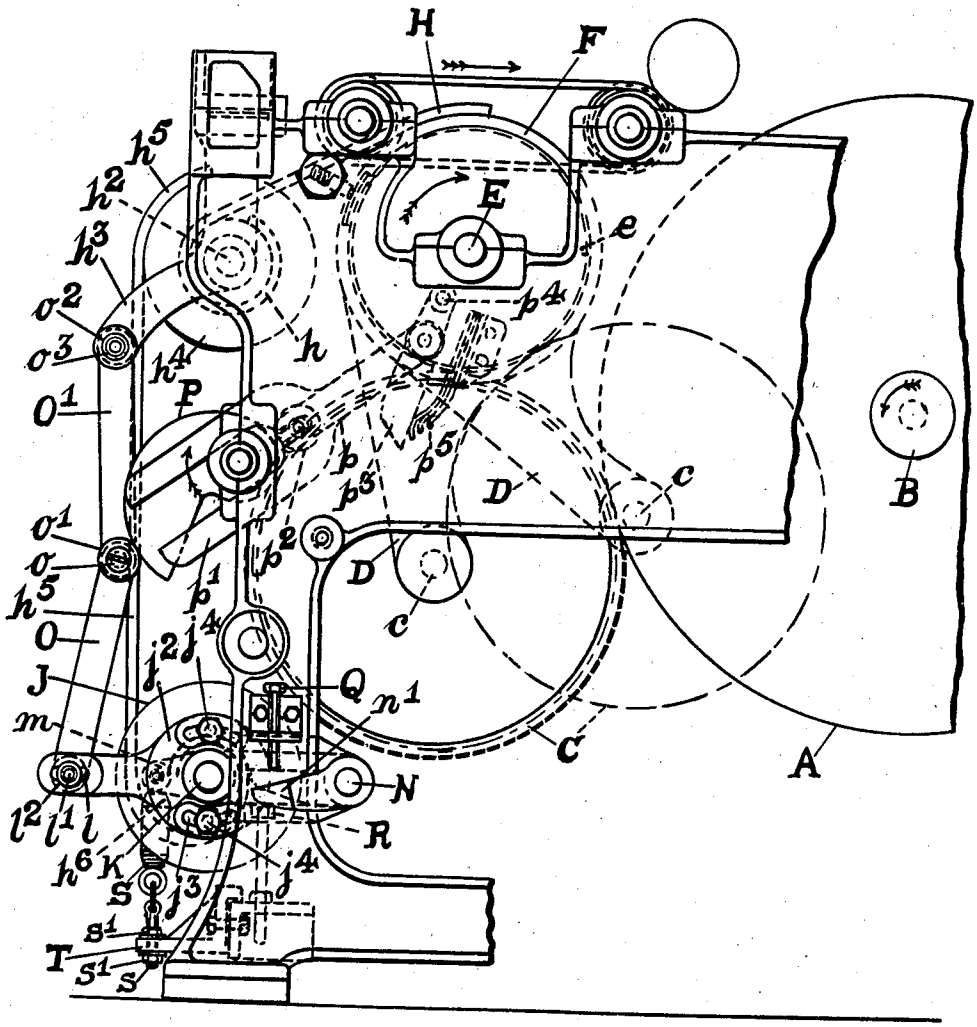
Oct. 19, 1943. J. R. BEE 2,332,364

SLIVER-BALLING OR ROLL FORMER APPARATUS

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FIG. 1.




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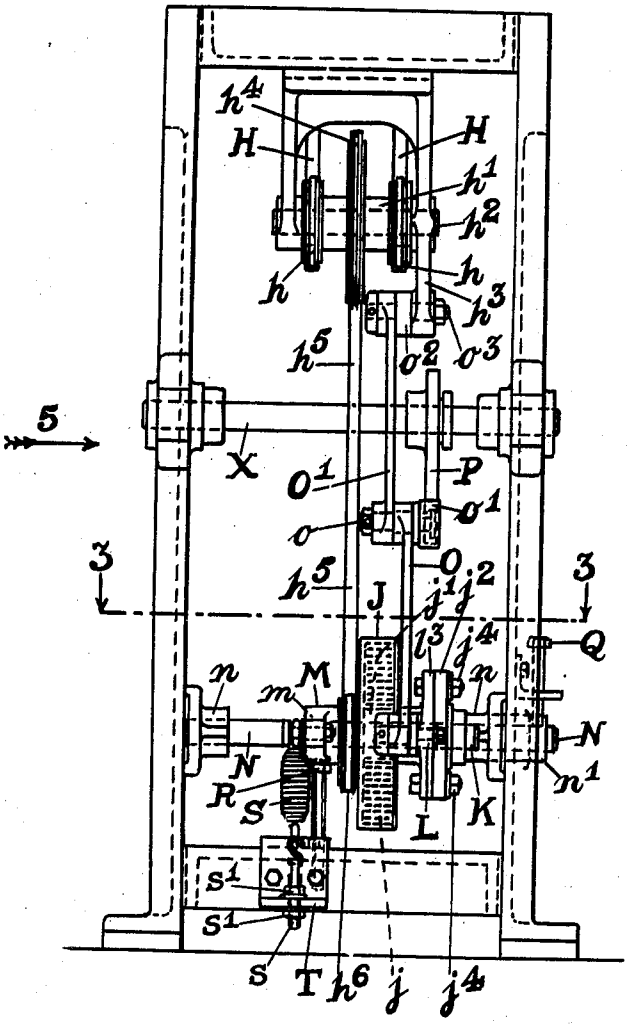
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SLIVER-BALLING OR ROLL FORMER APPARATUS

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FIG. 2.




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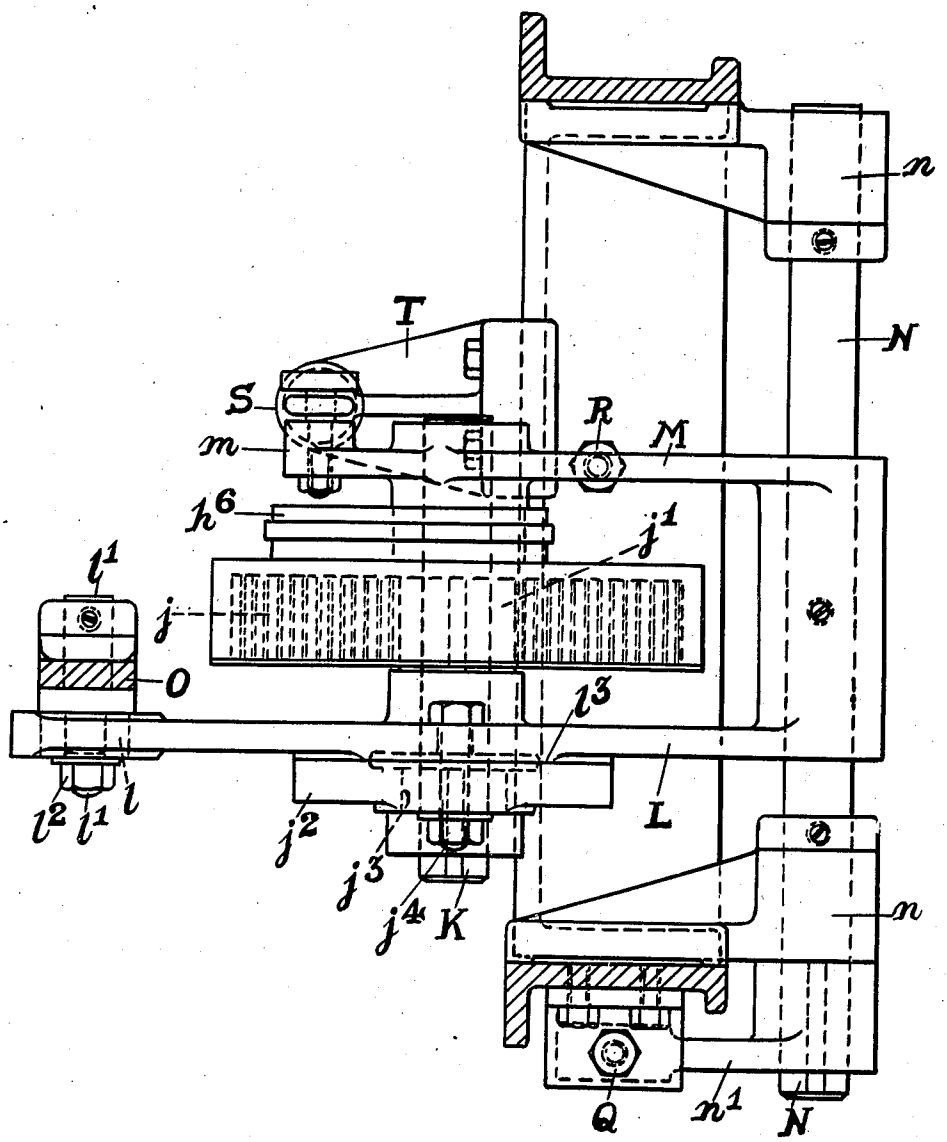
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SLIVER-BALLING OR ROLL FORMER APPARATUS

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FIG. 3.




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Eugene C. Stevens

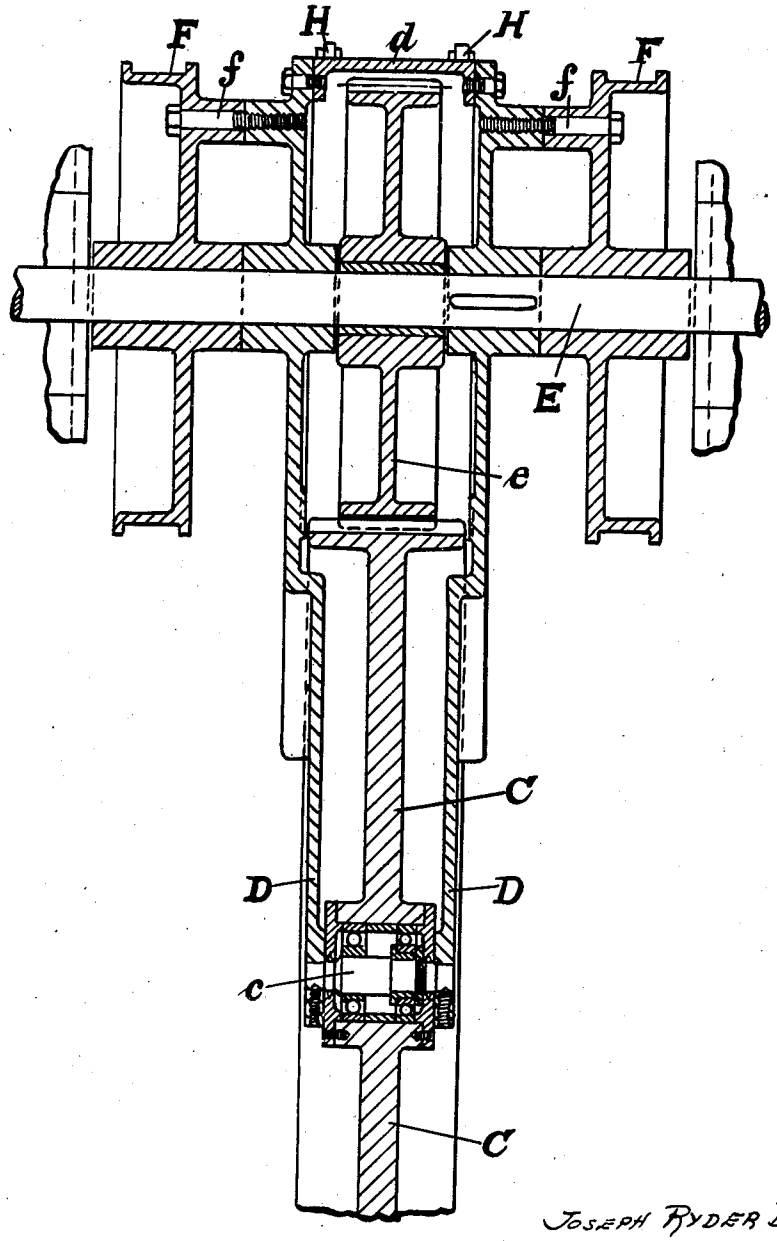
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SLIVER-BALLING OR ROLL FORMER APPARATUS

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FIG. 4.




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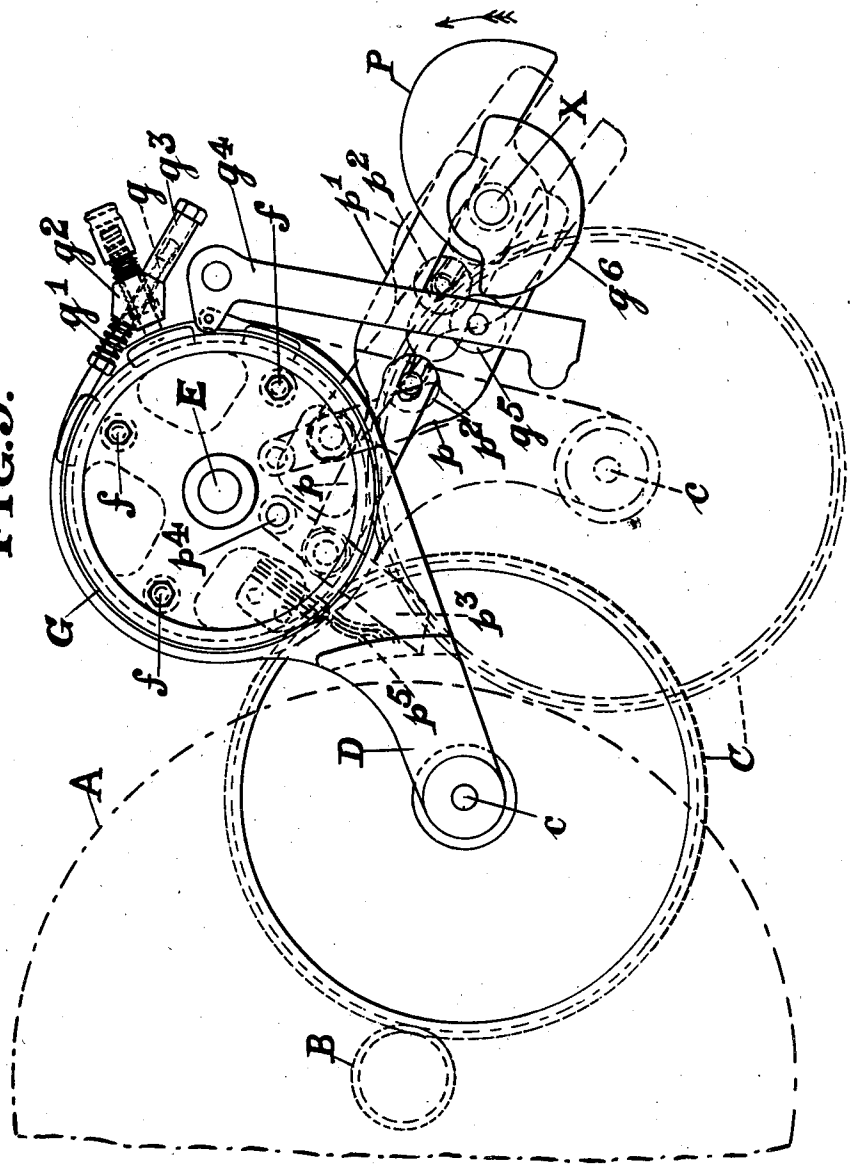
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SLIVER-BALLING OR ROLL FORMER APPARATUS

Filed April 21, 1941 5 Sheets-Sheet 5

FIG. 5.




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Patented Oct. 19, 1943 2,332,364

# UNITED STATES PATENT OFFICE

2,332,364

## SLIVER-BALLING OR ROLL FORMER APPARATUS

Joseph Ryder Bee, Leeds, England, assignor to Fairbairn Lawson Combe Barbour Limited, Wellington Foundry, Leeds, England, a corporation of Great Britain

Application April 21, 1941, Serial No. 389,680
In Great Britain October 12, 1940

3 Claims. (Cl. 19—158)

This invention relates to sliver balling or roll forming apparatus in which the ball or roll hereinafter referred to as roll is formed between a pair of discs upon a toothed centre, or centres, the discs being free to revolve with the roll as the latter is formed. To build a firm and solid roll a toothed pressure wheel is employed which initially engages the toothed centre or centres and drives the latter and subsequently engages the peripheral portion of the roll as the latter increases in diameter and drives it by friction. The toothed pressure wheel is mounted on a lever that is free to swing upon a shaft on which is fixed a gear wheel that drives the toothed pressure wheel. Arranged in rigid connection with the lever is a brake drum arrangement comprising one or more brake drums and brake bands which resist the backward movement of the lever as the roll increases in diameter. The brake band or bands can be adjusted to determine the pressure between the pressure wheel and the roll but it has been found that while this pressure is sufficient to ensure a solid centre to the roll, it is necessary to increase the pressure to some extent as the roll increases in diameter so as to maintain a solid well built roll throughout and up to the maximum diameter.

According to this invention an appliance is provided which comes into operation shortly after the commencement of the formation of the roll and gives an additional pressure to the pressure wheel as the roll increases in diameter and until its full size is attained.

This appliance may be additional and give an increasing additional pressure to the pressure wheel as the roll increases in diameter until its full size is attained.

In the accompanying drawings—

Fig. 1 is a side view of part of a sliver-balling or roll forming machine provided with means for giving an increasing pressure to the pressure wheel in accordance with this invention.

Fig. 2 is an elevation of the back of the machine shown in Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 2 and drawn to a larger scale.

Fig. 4 is a view of the brake shaft assembly in section, and

Fig. 5 is a view looking in the direction of the arrow 5 in Fig. 2, of the band brake and builder wheel return motion in position just as the band brake is being released.

A indicates the roll that is formed upon a pair of retractable centres B which project through and meet together between two spaced discs, not shown, which revolve with the roll as the latter is being formed. C indicates the toothed pressure wheel which initially gears with rounded teeth on the retractable centres and drives the latter and subsequently engages the peripheral portion of the roll A and drives it by friction. The pressure wheel C is freely mounted upon a pin *c* secured between two arms of a double armed lever D, Fig. 4, that is fixed on a shaft E and is driven by gearing from a wheel *e* freely mounted on the shaft E. Mounted on this shaft is one, or in some cases two brake drums F, each provided with a brake band G which resists the backward movement of the lever D as the roll increases in diameter, the brake drums being firmly attached to the lever D by screws *f* preferably three for each brake drum. In Fig. 5 one end of the brake band is attached to a screw *g* that is encircled by a spring $g^1$ and passes through a fixture $g^2$ and is provided with a nut $g^3$ for adjusting the tension of the band. The other end is attached to the short arm of a lever $g^4$ of which the long arm carries a runner $g^5$ that is adapted to be acted upon by a cam $g^6$ fixed on a cam shaft X. The mechanism above described is well known and constitutes no part of the present invention.

To give an additional pressure to the pressure wheel C which will come into operation shortly after the commencement of the formation of the roll and increase as the roll increases in diameter, two chains H are attached to a casing *d* that is attached to the arms D and acts as a cover for the wheel *e*. These chains are attached to the casing at a point opposite to each lever arm D and carried around, and fixed to two sprocket wheels *h* (Fig. 2) fixed on a sleeve $h^1$ that is rotatable on a shaft $h^2$ carried by a two-armed bracket $h^3$ that is attached to the machine frame. Rigidly connected with the sprocket wheels *h* is a sprocket wheel $h^4$ to which is attached one end of a chain $h^5$. The other end of this chain is taken round and attached to a scroll or fusee $h^6$ that is arranged in rigid connection with a spring box J. This spring box is rotatable upon a shaft K carried by a pair of arms L, M which are arranged in rigid connection with one another and are fixed on a shaft N that is rotatable in bearings *n* (Fig. 3) fixed to the machine frame. The free end of the arm L is formed with a slot *l* for a stud $l^1$ that can be fixed in an adjusted position along such slot by a nut $l^2$ and mounted on the stud is the lower end of one link O of a pair of links O, $O^1$ that are hinged together on a stud *o* (Fig. 2) on which is freely mounted a runner $o^1$. The upper end of the link $O^1$ is suspended from a

stud $o^2$ that is fixed to one arm of the two-armed bracket $h^3$ by a nut $o^3$. The runner $o^1$ is adapted to bear against the peripheral portion of a snail cam P when the latter is in its normal position as shown in Fig. 1. The cam P is fixed on the cam shaft X on which are fixed other cams for imparting endwise movement to the centres B in a known manner. In this position the two links O, $O^1$ are slightly out of line with one another and the arms L, M are prevented from rising due to a pull on the chain $h^5$. Situated within the spring box J is a volute spring $j$ (Figs. 2 and 3) that has its outer end attached to the inner peripheral portion of the spring box and its inner end attached to a boss $j^1$ that is fixed on the shaft K. The boss $j$ can be turned for adjusting the tension of the volute spring. For this purpose a plate $j^2$ is fixed on the shaft K outside the arm L and formed with concentric slots $j^3$ (Fig. 1) for bolts or screws $j^4$ by means of which the plate $j^1$ can be clamped to a face $l^3$ on the arm L after it has been turned to adjust the tension of the spring. Fixed on the shaft N is a finger $n^1$ which limits the upward turning movement of the arms L, M by the finger $n^1$ coming in contact with an adjustable screw Q, the downward movement of the arms being limited by the arm M contacting with an adjustable screw R. These screws can be adjusted so that the additional pressure exerted by the chains H, $h^5$ on the pressure wheel C is instantly removed immediately the snail cam P commences to revolve and in order to bring the arms back to their normal position with the bottom edge of the arm M resting on the screw R and assist in returning the links O, $O^1$ to their normal position a spring S is attached to the free end $m$ of the arm M and by means of an adjusting screw $s$ and a pair of adjusting nuts $s^1$ to a bracket T fixed to the machine frame.

At the commencement of the formation of the roll, the pressure wheel C is in gear with the toothed centres B, the chains H, $h^5$ are practically free from tension, and the snail cam P is in its normal position and supporting the jointed links O, $O^1$ in the manner described. When the pressure wheel has been moved a predetermined distance away from the toothed centres the chains become taut, but owing to the fact that the snail cam and jointed links prevent the arms L, M which carry the spring box J from rising, the latter is slowly turned against the resistance of the volute spring $j$ and the scroll on which the chain $h^5$ is winding gives an additional pressure to the pressure wheel which increases gradually as the roll increases in diameter until the full diameter of the roll has been attained. A release motion which is not shown and forms no part of the present invention then comes into operation and causes the cam shaft X carrying the snail cam to make one revolution.

When the snail cam commences to revolve, the point of the cam travels past the runner $o^1$ on the jointed links which then collapse inwardly towards the cam shaft and allow the arms carrying the spring box to rise and thus release the pressure on the chains and also the additional pressure on the pressure wheel. During this period while the additional pressure is released, other cams on the cam shaft come into operation to retract the toothed centres and allow the completed roll to fall away. The toothed centres are then immediately closed by their operating cams and the snail cam P forces the lever D forward until the pressure wheel C comes into gear with the retractable toothed centres B. A known form of mechanism for doing this consists of a connecting rod $p$, Fig. 5 formed with a forked end $p^1$ that rests on the cam shaft X and is fitted with a runner $p^2$ that is adapted to be engaged by the cam P. The connecting rod $p$ is pivoted to an arm $p^3$ that is pivoted at $p^4$ to the double-armed lever D. The arm $p^3$ acts against a laminated spring $p^5$ that is firmly fixed to the lever D. When the pressure wheel C comes into gear with the toothed centres B the spring $p^5$ yields slightly and ensures very firm contact between the wheel C and centres B and so enables the sliver to be caught firmly for the commencement of the new coil, the slight yielding of the spring also ensures that no breakages occur in the teeth of the gears. Simultaneously with this operation the brake bands are brought into action and the lever D is held in its extreme forward position until it is gradually forced back by the increasing diameter of the roll, the cam P moving round into the position shown in Fig. 1 and remaining in this position until the next roll is completed and ready to be ejected. This mechanism forms no part of the present invention and is merely included for the purposes of explanation. As the snail cam resumes its normal position it bears against the runner $o^1$ on the jointed links O, $O^1$ and moves them back to the position previously described.

What I claim as my invention and desire to secure by Letters Patent in the United States is:

1. In a machine for forming a roll of sliver upon a centre, a pressure wheel for rotating the roll, a braking appliance for causing the pressure wheel to exert a uniform pressure thereon, a spring arrangement for causing the pressure wheel to exert an additional pressure on the roll as the roll increases in diameter, means for energizing the spring as the roll increases in diameter and means for releasing the spring pressure when the full diameter of the roll has been attained.

2. In a machine for forming a roll of sliver upon a centre, a pressure wheel for rotating the roll and exerting pressure thereon, a pair of arms between which the pressure wheel is freely mounted, a shaft rigidly connected with the pair of arms, a brake drum arrangement rigidly connected with the shaft, gearing for rotating the pressure wheel, a pair of pivotally mounted arms, a shaft rigidly fixed to such arms and extending between same, a spring box rotatable on the shaft, a volute spring situated in the box and connected to the shaft and to the box, a fusee rigidly connected with the spring box, a rotatable sprocket wheel arrangement, a chain connection between the fusee and the sprocket wheel arrangement, a chain connection between the sprocket wheel arrangement and the brake drum arrangement, a pair of jointed links connected at one end to one of the pair of pivotally mounted arms and at the other end to a fixed anchorage, and a movable support capable of maintaining the jointed links in a position in which they are slightly out of line with one another and of assuming a non-supporting position when the full diameter of the roll is attained.

3. In a machine for forming a roll of sliver upon a centre, a pressure wheel for rotating the roll and exerting pressure thereon, a pair of arms between which the pressure wheel is freely mounted, a shaft rigidly connected with the pair of arms, a brake drum arrangement rigidly connected with the shaft, gearing for rotating the pressure wheel, a pair of pivotally mounted arms,

a shaft rigidly fixed to such arms and extending between same, a spring box rotatable on the shaft, a volute spring situated in the box and connected to the shaft and to the box, means for setting the tension of the volute spring, a fusee rigidly connected with the spring box, a rotatable sprocket wheel arrangement, a chain connection between the fusee and the sprocket wheel arrangement, a chain connection between the sprocket wheel arrangement and the brake drum arrangement, a pair of jointed links connected at one end to one of the pair of pivotally mounted arms and at the other end to a fixed anchorage, a runner carried by the jointed links, a cam against which the runner is adapted to bear and support the links in a position in which they are slightly out of line with one another, adjustable stops for limiting the amount of upward and downward movement of the pair of arms and means for exerting a downward pull upon the latter.

JOSEPH RYDER BEE.