Feb. 23, 1932. C. GEGAUFF 1,846,715

FLY FRAME

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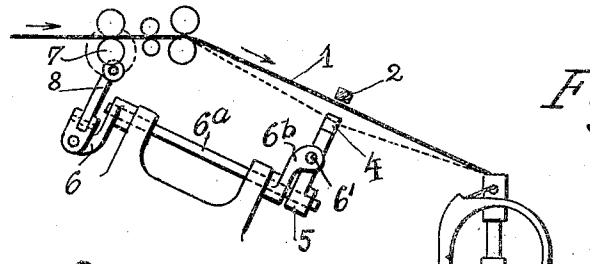
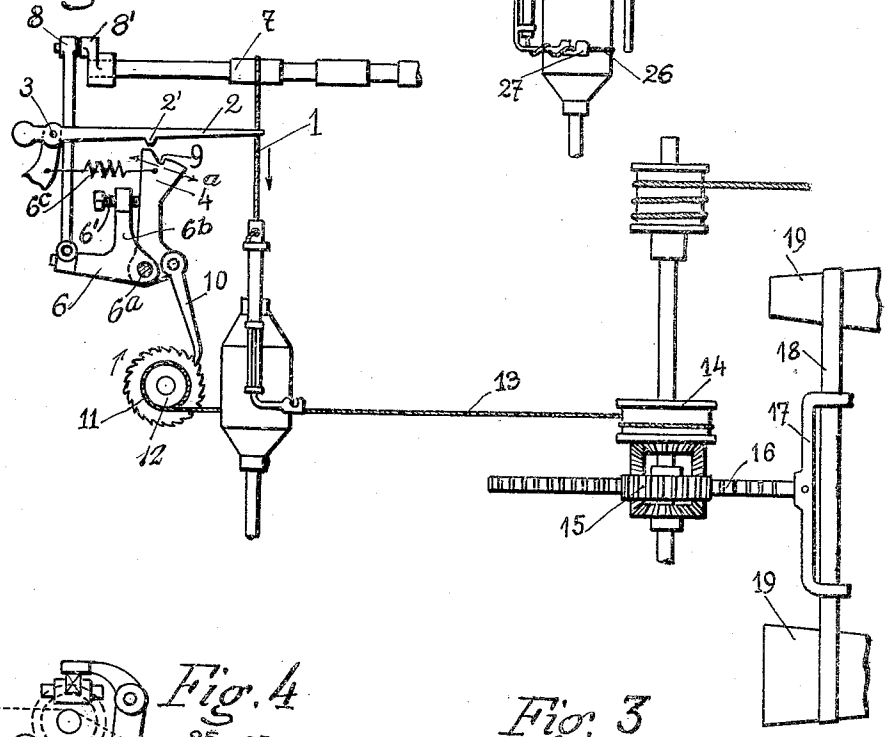



Fig. 1

Fig. 2



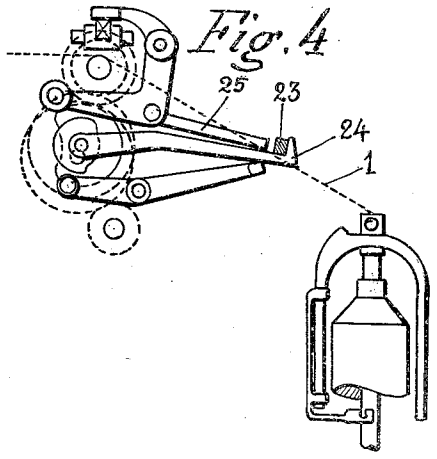
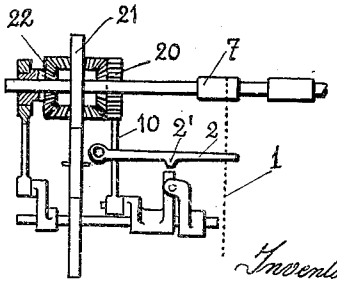




Fig. 4

Fig. 3




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Fig. 5

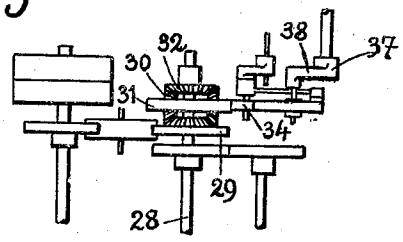



Fig. 6

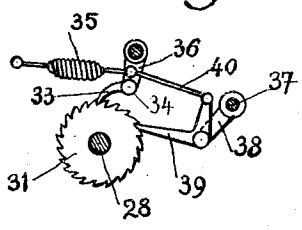



Fig. 9

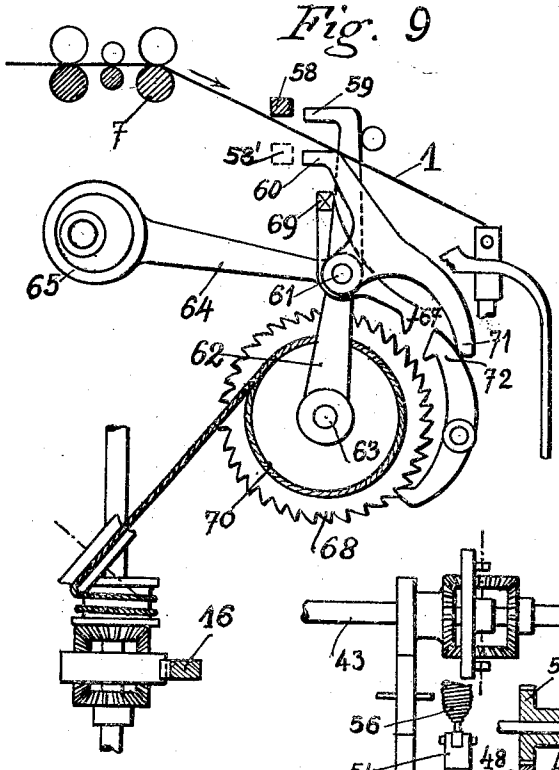



Fig. 7

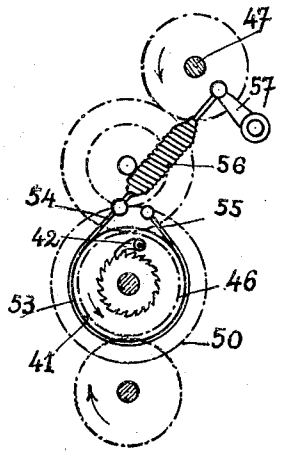
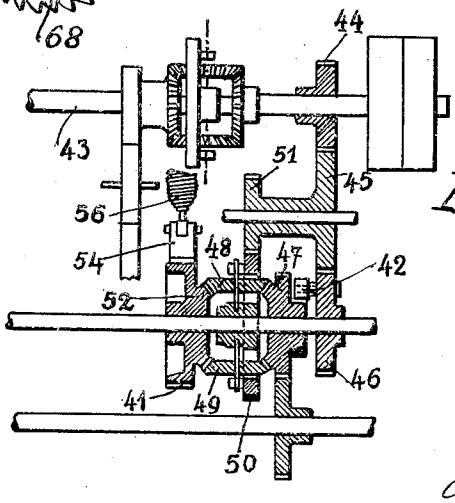



Fig. 8




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# UNITED STATES PATENT OFFICE

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## FLY FRAME

Application filed November 10, 1928, Serial No. 318,559, and in France November 16, 1927.

The object of the present invention concerns a device for regulating the tension of rovings during the winding up of the latter in fly frames for wool or cotton.

None of the known control systems for varying the tension of yarn can be used with roving, by reason of their operating by means of tension feelers which are always in contact with the yarn and maintain same constantly bent. With roving, owing to its downy condition and its small resistance, the continuous contact and bending of a feeler is not permissible.

The object of the invention is to provide a device which operates in such a way that, when the tension of the roving exceeds a given predetermined limit, the traction during winding automatically decreases, through the medium of a rod or lever periodically feeling said roving, whereby the tension of the roving is brought back to its normal value and cuts in the roving are avoided. Since the device only operates when the roving tension is not normal, the predetermined number of engagements of the control member of the device for a given time is taken as base for the good or bad working of the fly frame.

Instead of being controlled directly by the above mentioned feeler device, the roving tension may be indirectly influenced by means dependent on the value of the driving power for the fliers or for the bobbins, which power is, as is known, in definite relation with the roving tension during winding of the latter.

The invention will be described hereafter with reference to the accompanying drawings.

Figs. 1 and 2 show a regulation device making use of a feeler whereby a shifting of the driving belt on conical belt pulleys is brought about when the tension of the roving exceeds a certain limit.

Fig. 3 shows a regulation device making use of a feeler, whereby the movement of the feeler is transmitted to the delivery rollers.

Fig. 4 shows another embodiment of the transmission of the movement of the feeler.

Figs. 5 and 6 show a tension regulating device making use of the relation existing between the yarn tension and the driving force of the fliers or bobbins during the winding up of the yarns.

Figs. 7 and 8 show another embodiment of the device illustrated in Figs. 5 and 6.

Fig. 9 shows a regulation device which brings the yarn tension back to its normal value both when said tension is too great and when it is too small.

Figs. 1 and 2 show the roving 1 and a feeler 2 rotatable about a spindle 3, said feeler resting periodically upon the roving and bringing about a deflection of said roving represented by the dotted line in Fig. 1. The roving 1 runs over a delivery roller 7, the end of which carries a crank 8′, the latter oscillating, as indicated by the double arrow *a*, by means of a connecting rod 8, a two-armed lever 6, 6*b*, fixed on the axis 6*a*. The lever 6*b* is provided with an adjustable screw bolt 6′ resting against a finger 4, the latter being mounted on the axis 6*a*, but not fixed thereto. A spring 6*c* is fixed with one end to the finger 4, and with its other end to a fixed point, thus ensuring the contact between the finger 4 and the screw bolt 6′.

The finger 4 shows on its upper part a notch 9, in which a nose 2′ of the feeler 2 may enter. A pawl 10 is pivotally mounted on the part of the finger 4 near to the axis 6*a*, said pawl engaging a ratchet wheel 11.

During the oscillation of the finger 4, the latter grazes the nose 2′ of the feeler 2 and lifts this nose 2′ on each of its passages; in this way the feeler 2 rests only periodically upon the roving.

When the roving is not too much stretched, the feeler 2 occupies such a position as to enable the nose 2′ to enter into the notch 9, thus preventing a further backward oscillation movement of the finger 4, but the lever 6, 6*b* continues its oscillation movement.

When the tension of the roving is too great, the feeler 2 will keep its raised position and its nose 2′ will not at all engage the notch 9, so that the finger 4 is free to travel its whole swinging path and to actuate the device for reducing the roving tension.

Now the pawl 10 engaging the ratchet wheel 11 imparts to the latter, as also to the drum 12, mounted on the ratchet wheel 11, a ro-

tary movement, which is transmitted to the drum 14, by means of a rope or small chain 13. The rotary movement of the drum 14 is, for instance, transmitted by means of the toothed wheel 15 and the rack 16 to the belt fork 17, whereby a shifting of the belt 18 on the conical belt pulleys 19 is brought about and a reduction in the speed of the bobbins and in the tension of the roving is obtained.

Instead of the above-described device for reducing the tension of the roving, a device can be inserted in the driving device of the delivery rollers, which is adapted to bring about a momentary change in the speed of said driving member, for instance, a differential device or a clutching with various degrees of speed.

Fig. 3 illustrates an embodiment, in which the pawl 10 actuates the drawing or delivery roller 7 through the medium of a differential device, whereby, on the one hand, said pawl acts upon a ratchet wheel 20 loosely mounted on the roller 7 and, on the other hand, the wheel 21 imparts the uniform main movement to the delivery rollers, through the medium of the wheel 22 mounted on the roller 7. The wheel 22 is thus imparted the total of the movements of the wheel 21 and of the ratchet wheel 20, and will thus rotate at a greater speed when the ratchet wheel 20 is moving than when said wheel is standing still.

The arrangement of the roving feeler can also be used to influence the speed of the fliers or bobbins, for instance to increase slightly this speed when the roving tension is too high. This can be brought about by acting upon the pawl, by means of a differential device inserted either in the driving device of the fliers or in the driving device of the bobbins.

Fig. 4 illustrates a transmission device of the movement of the feeler, in which the feeler 23 also rests constantly or periodically on the yarn 1. In its rest position, it lies on the support 24. When the feeler is to enter into action, the support 24 is lowered of a short distance and, according to whether the roving tension is normal or too great, the feeler 23 will go down with said support or will remain in its position. In the latter case, i. e. when the tension of the roving is too great, a clearance space is formed between the feeler 23 and the support 24, in which space can penetrate a front and backward swinging tongue 25, which also rests upon the support 24. This oscillation and penetration of the tongue 25 is used to release the device intended to vary the speed of the elements in question, i. e. the device intended to adjust the tension of the roving.

Instead of the above-described transmission between the feeler and the speed varying device, an electric contrivance, for instance an electro-magnet, can be used, in which the feeler merely brings about the switching in of the electric contrivance.

In the regulation devices making use of feelers, the yarn tension is directly controlled and the movement of the control elements is directly transmitted to the device for varying the tension of the yarn. From the relation existing during the winding up between the yarn tension and the driving force of the fliers or bobbins, an indirect method for regulating the tension of the yarn can be derived. Indeed, the tensioned part 26 (Fig. 1) of the yarn, which connects the pressure finger 27 of the flier with the bobbin, forms a force delivered by the bobbin and working upon the flier, since the bobbin rotates at a greater speed than the flier and tends to pull the latter with it. The tensioning of the yarn will thus bring about a reduction in the force necessary for driving the fliers and an equivalent increase in the force necessary for driving the bobbins.

If a device intended to vary the force transmitted is inserted in the driving elements of the fliers or the bobbins, either a contrivance bringing about the reduction of the traction exerted on the yarn can be actuated by means of said device, or said device can itself bring about said reduction in the traction on the yarn.

A device working according to this principle is illustrated in Figs. 5 and 6. In this device, a differential contrivance 29, 30, 31, 32 is inserted in the driving elements of the fliers, said elements being driven by the shaft 28. The force transmitted through these wheels tends to move the wheel 31 which carries the planet wheels, in such a manner that a more or less great force is exerted on the pawl 33, which acts in opposition to the rotary movement of the wheel 31, said force being proportional to the transmitted force and being liable to be used for actuating a tension adjusting device, when the pin 34 supporting the pawl 33 is maintained in its position by a spring 35; the pawl 33 and the lever 36 carrying said pawl will occupy two outermost positions, for which the spring 35 will be more or less tensioned. The release of the device varying the speed of the fliers by means of the lever 36 works as follows: on the shaft 37 is pivotally mounted an oscillating lever 38, carrying a pawl 39 engaging in the wheel 31; a rod 40 connects the pawl 39 to the lever 36. According to whether the lever 36 occupies the one or the other of its outermost positions, the pawl 39 will impart or not a rotary movement to the wheel 31, whereby in the first case an increase in the speed of the flier will be brought about.

Another embodiment of the tension adjusting device according to this principle is illustrated in Figs. 7 and 8. According to these figures, the driving of the flier is supported by means of a device 41—56, which aims at

obtaining a greater speed of the flier than the normal speed of the latter. Since, as explained hereabove, the tension of the yarn forms a driving force for the flier, said force in combination with the device 41—56 will be sufficient for the driving of the flier, without the help of the pawl 42, when the tension of the yarn has exceeded a certain limit. The object of the pawl is only to secure the normal speed to the fliers when the tension of the yarn is normal, which speed it obtains from the main driving shaft 43, through the medium of the wheels 44, 45, 46. When the force consumed by the fliers has diminished on account of a too great tension of the yarn, the device 41 alone develops the driving force of the flier, the speed of which rises above its normal speed, whereby the tensioning of the yarn is adjusted. The working of said device 41—56 upon the wheel 47, through the medium of the planet wheels 48, 49 and 50, is as follows: the wheel 50 carries both planet wheels 48 and 49. It obtains from the main driving shaft 43, through the medium of the wheels 44, 45 and 51, a rotary speed which is somewhat greater than half the speed of the wheel 46, which carries the pawl 42. From these two speed components, the wheel 52 receives as a resultant speed, a slow rotary speed having the same direction as that of the wheels 47 and 50. The end 54 of the belt 53 slung about the drum 41 is thus tensioned, while the end 55 of said belt 53 is loose. This tensioning of the end 54 brings about the tensioning of the spring 56 to which it is fastened: the other end of said spring 56 is attached to the lever arm 57. This tensioning brings about a driving force, which is transmitted through the planet wheels 48, 49 to the wheel 47 and thence to the flier, with the result of increasing the speed of the latter of about 10 to 15% above its normal speed, which normal speed is secured by the pawl 42.

During the progressing of the bobbins, the spring 56 must be slowly untensioned; this is brought about by means of a very slow rotary movement of the lever 57.

Instead of the drum 41 illustrated in the embodiment of Figs. 7 and 8 and the belt 53 slung about said drum, a friction coupling can be provided, for instance a coupling with friction balls, which coupling is loosely mounted on the driving shaft of the flier and is adapted to engage a counterball coupling mounted on the same shaft.

The yarn tension adjusting devices described up to now are all designed to reduce the tension of the yarn, when the latter exceeds a certain limit. The device illustrated in Fig. 9 is adapted to adjust the tension of the yarn, both for too great tensions and for too small tensions, i. e. it reduces a too great tension of the yarn and it increases a too small tension of said yarn. This adjusting device is based upon a shifting of the belt 18 on conical belt pulleys 19 (Fig. 2), either in the one or in the other direction. As indicator of the tension of the yarn a feeler 58 is used, which rests upon the yarn 1, in such a manner that, according to the tension of the yarn, its free end occupies a higher or lower position. The members 59 and 60, mounted on the shaft 61, cooperate with the feeler 58, the shaft 61 being connected to the shaft 63 by means of an arm 62, in such a manner that the whole device is imparted an oscillating movement about the shaft 63, through the medium of the eccentric arm 64 engaging the spindle 61. For every rotation of the eccentric 65, the two members 59 and 60 oscillate against the feeler 58, which occupies the position 58 when the tension of the yarn is too great and the position 58′ when the tension of the yarn is too small, an intermediate position being occupied by it when the tension is normal. According to the abnormal position of the feeler, the one member 59 or the other member 60 is hindered in the accomplishment of its movement towards the left by the feeler 58.

When the tension of the yarn is too great, the member 59 will engage the pawl 67 in the ratchet wheel 68, with the help of the stop 69, which occurrence tends to maintain a spring not illustrated in the figure. The stop 69 of the pawl 67 then leaves the member 59 and the pawl 67 takes a lying position on the teeth of the ratchet wheel 68 and can slide upon the latter without moving it. When the member 59 swings back to its first position, the pawl 67 will force the ratchet wheel 68 to move in this direction, whereby the rotation of the rope drum 70, mounted on the same shaft as the ratchet wheel 68, is brought about and a shifting of the belt on the conical pulleys 19 (Fig. 2) is obtained through the medium of the rack 16.

When the tension of the yarn is too small, the member 60, when swinging towards the left, will encounter the feeler occupying, in this case, the position 58′, whereby the pawl 72 is engaged in the ratchet wheel 68, with the help of the finger 71. The rotary movement of the ratchet wheel 68 and thus also of the rope drum 70 thus brought about will be effected in the opposite direction of the rotary movement brought about owing to a too great tension of the yarn; this rotary movement is transmitted to the rack 16, whereby a shifting of the belt on the conical pulleys, in a direction opposite to the above obtained direction is brought about.

When the tension of the yarn is normal, the feeler 58 occupies an intermediate position between the positions illustrated in Fig. 9, so that the members 59 and 60 can carry out, without being hindered, their swinging movement towards the left and no rotary movement either in one or the opposite di-

rection of the rope drum 70 is brought about.

I claim:

1. A control system applicable in fly frames for controlling the tension of the roving during winding comprising a rotary bobbin, a flier coaxial therewith for winding the roving on said bobbin, pairs of delivery rolls for the roving, a feeler rod capable of movement in a vertical plane and adapted to rest upon the roving intermediate the rolls and the flier, in such a way that the substantial straightness of the stretch of roving extending from the last pair of delivery rolls to the top of the flier is not at all affected thereby and control means indirectly actuated by said feeler rod for varying the rotation speed of one of the rotating members for delivering and winding the roving and thereby varying the tension of the latter.

2. A control system applicable in fly frames for controlling the tension of the roving during winding comprising a rotary bobbin, a flier coaxial therewith for winding the roving on said bobbin, pairs of delivery rolls for the roving, a feeler rod capable of movement in a vertical plane and adapted to rest upon the roving intermediate the rolls and the flier, in such a way that the substantial straightness of the stretch of roving extending from the last pair of delivery rolls to the top of the flier is not at all affected thereby, conical driving pulleys actuating one of the rotary members for delivering and winding the roving, a belt adapted to be shifted along said pulleys, a belt fork for shifting said belt and indirectly actuated by said feeler rod.

In testimony whereof I signed hereunto my name.

CHARLES GÉGAUFF.