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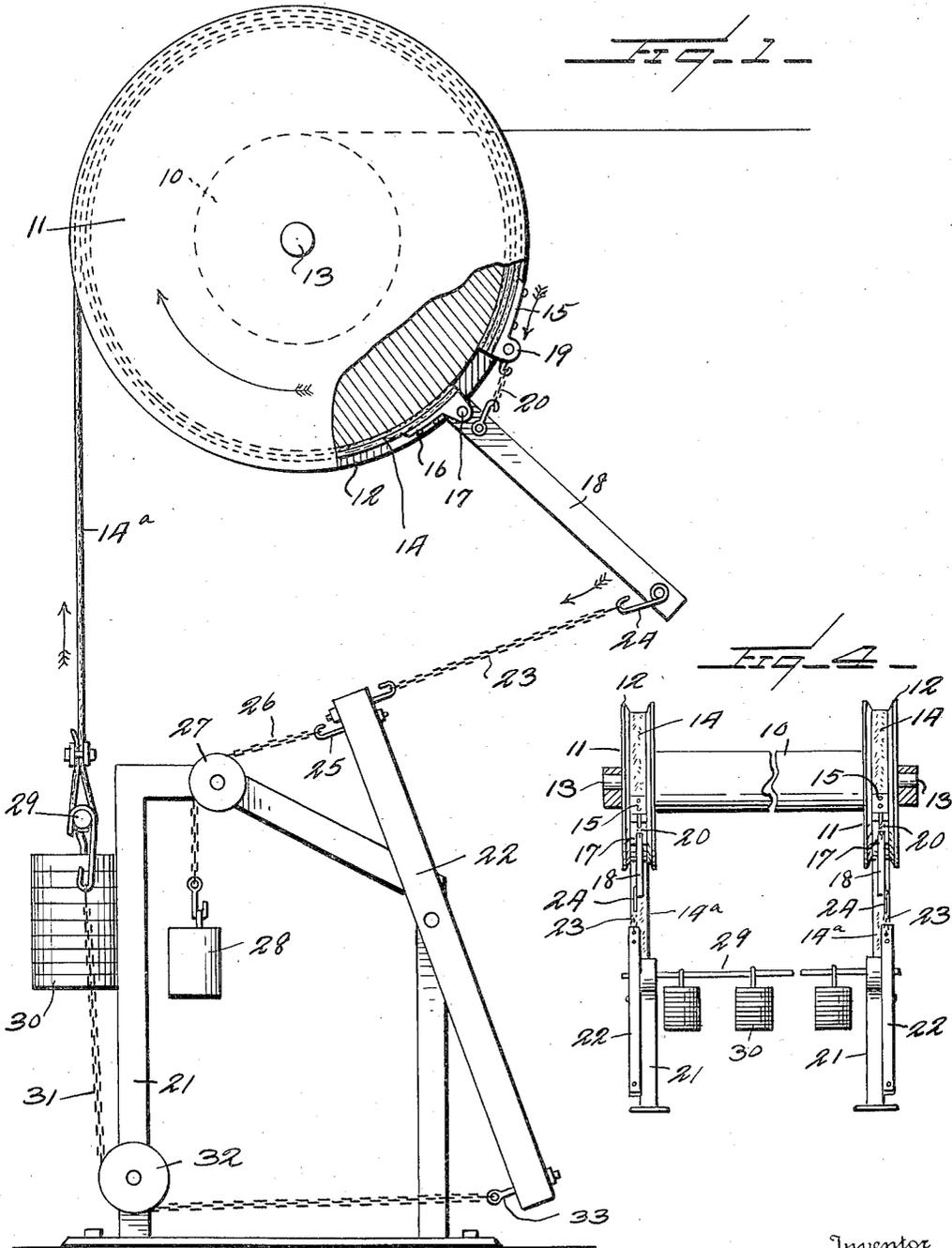
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TENSIONING MEANS FOR LOOM LET-OFF BEAMS

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2 Sheets-Sheet 1



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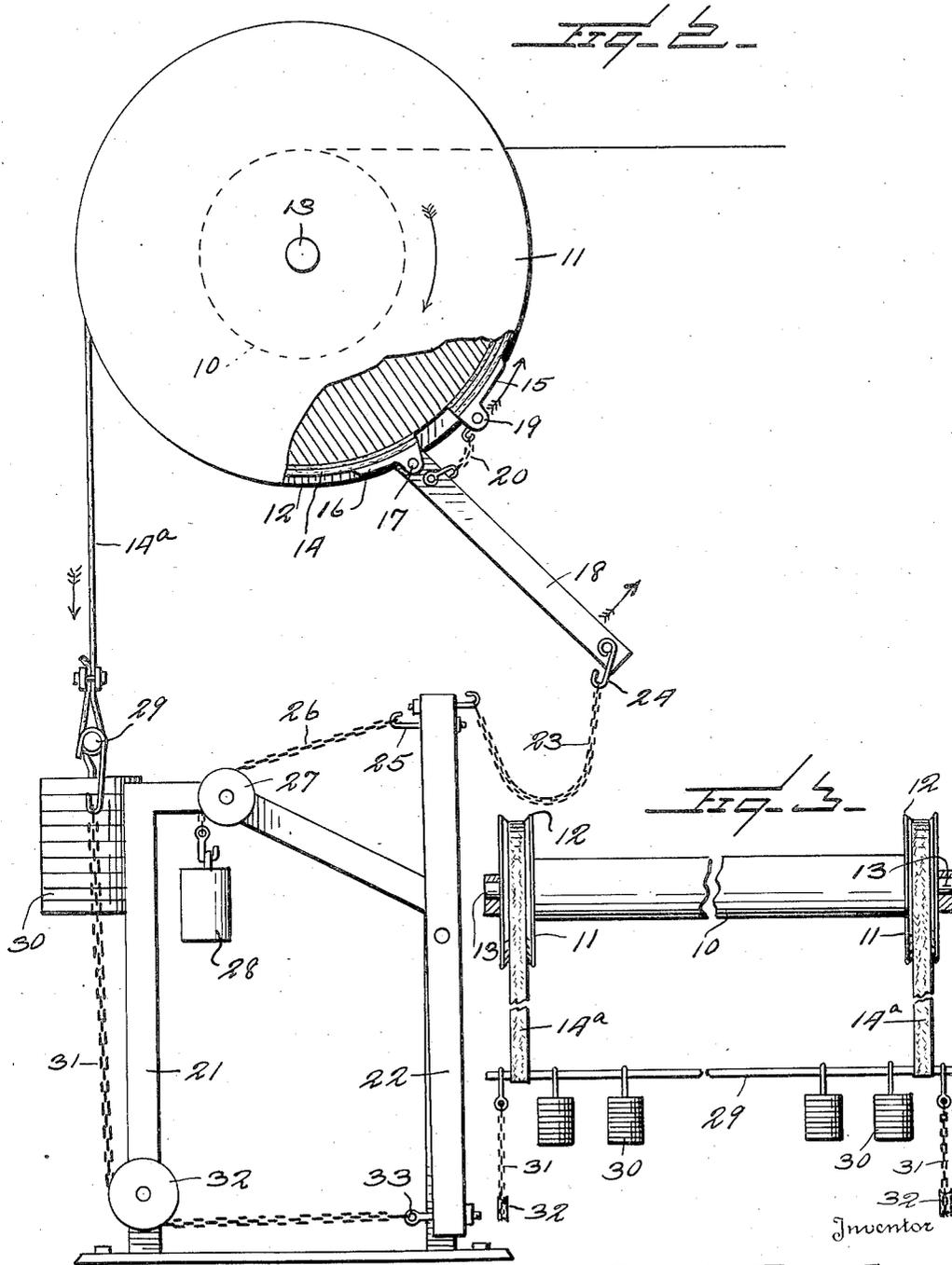
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UNITED STATES PATENT OFFICE

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TENSIONING MEANS FOR LOOM LET-OFF BEAMS

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12 Claims. (Cl. 139—100)

This invention relates to improvements in the let-off beams of looms and particularly to means for keeping a constant and uniform tension on the warp, the mechanism being particularly adapted for use in silk looms, though it may be also used on cotton and woolen looms.

Various friction creating or tension creating means have been devised and used for this purpose, but the tensioning means usually used consists of a rope wound a plurality of times around a head of the warp beam, there being weights on the ends of the rope, thus creating a friction, resisting rotation of the left-off beam or warp beam and thus keeping a constant tension upon the "ends". Tensioning means of this character are open to many objections. The tension upon the first lap of the rope above referred to, which first lap is connected to a weighted lever, is very great and it is this very great pressure which causes it to grip the drum or head of the beam, this causing an uneven distribution of tension. Even so, this friction warp tension caused by the use of a rope wound around the drum, has proved the most satisfactory of all of the other methods proposed. However, the loom fixer must constantly take the ropes off every few days and rub them with flake graphite or some other lubricating substance and even when this is done, it is impossible to make these ropes slide evenly on heavy weighted warps during damp weather.

Furthermore, the rope tension contacts with the head only at one point in the circumference of the rope and when the contact between the rope and the beam head is about three-sixteenths of an inch wide, then less than six square inches of rope is in contact with a ten inch warp head for the entire three laps of the rope and thus very great pressure must be placed upon the rope or a very great pull in order to secure sufficient friction.

The general object of the present invention is to provide a friction tensioning device for let-off beams which will provide for a great deal larger area of braking surface or tensioning surface and which is not open to the objections to which the rope tensioning means heretofore described is open.

A further object is to provide a structure of this character embodying a brake band located at each end of the beam and engaging the heads thereof, each brake band having a relatively large area of contact with the corresponding head and provide positively acting means for causing the release of tension on the brake band as soon

as this brake band starts to move with the beam head and further provide for this purpose a braking arm operatively connected as will be described to opposite ends of the brake band and connected to a weight urging the brake band closed, the brake band as a whole being operatively connected to another weight acting to rotate the brake band in a direction reverse to the direction of rotation of the beam head, and so connected to the arm that as soon as the brake band starts to rotate with the beam head, the pull on the brake arm will be positively released and the tension on the brake band decreased.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation partly in section of a let-off beam with my frictional braking mechanism applied thereto and showing the brake applied;

Figure 2 is a like view to Figure 1 and showing in a greatly exaggerated manner the action taking place when the brake is released;

Figure 3 is a rear elevation of the beam and its connections to the weight supporting rod;

Figure 4 is a front elevation of my mechanism.

Referring to these drawings, 10 designates a warp beam which is ordinarily of wood and has a length of approximately five feet. Mounted upon the ends of this warp beam are the usual heads 11, these heads being of iron and having a width between the flanges 12 of approximately 2¼ inches. The frame supporting this beam has not been illustrated but the beam rotates around an axis formed by the warp bracket pins 13.

Disposed to surround each of the heads and fit between the flanges 12 is a brake band designated generally 14 which is preferably formed of woven material which is chemically treated so that weather conditions will not affect it. Two plies of this woven material extend entirely around the beam head 11 and one ply of the woven material extends partly around the beam head and then extends downwardly therefrom. The plies may be riveted or otherwise attached to each other at any desired or necessary points. Attached to the extremities of the band 14 are the steel clips 15 and 16, these preferably being riveted to the ends of the band. The clip 16 is bifurcated and disposed within this bifurcation and pivoted to the clip at 17 is a braking arm 18. This braking arm is about eight inches in length under ordinary circumstances. The clip 15 is provided with an eye 19 and connected

to the braking lever 18 about one inch from its pivot 17 is a chain or equivalent connection 20 which in turn is connected to the eye 19 of the clip 15. It will thus be obvious that when the lever 18 is pulled downward, the brake band will be tightened up upon the head and that when it is moved in the other direction, the brake band will be loosened.

Disposed below each head of the warp beam 11 is a supporting frame designated 21 which is held rigidly to the floor by screws 22 or any other suitable manner. This frame is approximately nine inches from front to rear and approximately thirteen inches in height at its rear and say ten inches in height at its forward end. Pivotaly mounted upon this frame is a lever 22, the upper end of the lever being somewhat nearer to the pivot than the lower end of the lever, though this is a matter of adjustment and connected to the upper end of this lever is a chain 23 which in turn is connected to the free end of the arm or lever 18 by means of the link 24. Also connected to the upper end of the lever 22 as by means of the hook 25 is a chain 26 which passes over a pulley 27 carried by the frame, this chain at its lower end supporting a weight 28 which may be from five to fifteen pounds depending upon the circumstances. It will be seen that this weight tends to pull inward or rearward the upper end of the lever 22 and that this pulls downward upon the brake arm 18. Thus the weight 28 tends to apply the brake band.

The outer ply 14a of the brake band 14 depends over the rear of the brake band and at its lower end it supports a transverse weight bar 29 carrying a plurality of weights 30, the number of weights carried depending upon the number of warp ends used and the tension desired to be placed upon the warp ends.

Engaged with the ends of the rods 29 are chains 31, these chains extending downward parallel to the rear of the frame 21, passing beneath the pulley 32, and being connected to a hook 33 carried by the lower end of the lever 22.

It is to be understood that at each end of the beam, that is, upon each head of the beam, there is a brake band 14 with its lever 18 and that each lever 18 is connected to a lever 22 urged rearward by means of a weight 28, both of these levers at their lower ends being connected by a chain 31 to the weight bar 29.

The operation of this mechanism is as follows:—

The warp beam with its heads is being pulled in the direction of the arrow in Figure 1 by the warp threads or ends. If there was no brake upon the beam, the beam would move freely and no tension would be placed on the warp threads. The brake band 14, therefore, when it is tightened exerts frictional resistance to the rotation of the beam 11 and tends to rotate as a consequence with the beam against the action of the weights 30 on the weight bar 29. If the brake bands were at all times tightly engaged with the beam heads, the rotation of the beam would act to lift the weights 30. It is, therefore, necessary that the brake band shall be released intermittently at very short intervals so that the brake band has a sliding engagement with the beam head. This is secured by the mechanism which I have described. Ordinarily the weights 28 exerting a pull upon the arms 18 will draw the brakes tightly against the heads but as soon as the brake bands shift with the beam in the direction of the arrow, the chain 31 is pulled up-

ward by the upward movement of the weight bar and this draws the lower end of the lever 22 inward relaxing the tension on the chains 23 and relaxing the pull on the arms 18, thus slackening the pressure of the brakes. As soon as the brake pressure has been relieved, the weights on the weight bar again act to urge the brake bands in a counter-clockwise direction, thus again permitting the weights 28 to apply the brakes and again causing a release of the brakes as soon as the brake bands move with the beam.

It will be seen that in my mechanism, the releasing movement is positive in its action. The moment that the band 14 rotates with the beam head, the pressure is instantly released. In my invention, the pressure producing the frictional resistance to a rotation of the beam heads is spread over a surface of more than twenty square inches, using the band two and one-quarter inches wide and lapping around a ten inch warp beam head.

It will, of course, be understood, however, that my invention is capable of use on a six inch, ten inch, eight inch or beam head of any size and that it is equally applicable to a beam having any desired length. It is because of the positive releasing action which I have provided that my mechanism is particularly adapted to broad silk looms. This releasing mechanism has been found in practice to work very steadily and gives a much more even tension than any mechanical warp let-off or old fashioned weighted rope friction that I have ever seen.

It will be seen that with this invention, if the tension is exactly right, there will be a constant frictional engagement of a predetermined amount between the brake band and the warp beam resisting to a predetermined degree the rotation of the warp beam but that if this brake band starts to clamp too tightly and move with the warp beam, it is promptly released and the tension on the brake band and the frictional engagement with the beam head relieved.

While I have illustrated certain details of construction and certain arrangements of parts which I have found to be thoroughly effective for the purpose intended, I do not wish to be limited to these as many changes might be made without departing from the spirit of the invention as defined in the appended claims.

It is to be understood that in Figure 2, I have illustrated in a greatly exaggerated manner the action taking place when the weight 30 moves upward and releases the brake.

I claim:—

1. A braking mechanism of the character described including a rotatable head, a brake band embracing the head, an arm pivoted to one end of the brake band and having an operative connection adjacent said pivot to the other end of the brake band, a weight urging said arm in a direction to apply the brake band to the rotatable member, a weight resisting rotation of the brake band with the rotatable head when the brake band is tightened, and means entirely independent of the brake band and arm connected to the last named weight and operatively connected to the first named weight to positively lift the first named weight when the second named weight is lifted by a rotation of the brake band with the member to thus relieve the strain on the brake arm, and relieve the tension on the brake.

2. The combination with a let-off beam having a head, of a brake band embracing the head, an arm pivoted to one end of the brake band, a

connection between said arm and the opposite end of the brake band, said connection being disposed between the pivot of the arm and the free end thereof, a weight carried by and urging the arm in a direction to tighten the brake band on the head, and means entirely independent of the brake band and arm acting automatically immediately that the band moves with the head to relieve the tension on the arm of the weight carried thereby to thereby relieve the tension on the brake band.

3. The combination with a let-off beam having a head, of a brake band embracing the head, an arm pivoted at one end of the band, a connection adjacent the pivot of the arm to the opposite end of the band, a lever pivoted intermediate its ends and connected at one end to the free end of the arm, a weight operatively connected to the last named end of the lever and acting to draw the lever in a direction to cause the arm to tighten the brake band, and an operative connection from the brake band to the other end of said lever acting to retract the last named end of the lever, lift the weight and relieve the tension on the brake band when the brake band moves in the same direction as the head.

4. The combination with a let-off beam having a head, of a brake band embracing the head, an arm pivoted at one end of the band, a connection adjacent the pivot of the arm to the opposite end of the band, a lever pivoted intermediate its ends and connected at one end to the free end of the arm, a weight operatively connected to the last named end of the lever and acting to draw the lever in a direction to cause the arm to tighten the brake band, a weighted element, an operative connection from the weighted element to the brake band and urging the brake band in a direction reverse to the direction of movement of the head, and a positive connection from said weighted element to the end of said lever opposite from its point of attachment to the arm.

5. The combination with a let-off beam having a head, of a brake band embracing the head, an arm pivoted to one end of the brake band, a connection from said arm to the other end of the brake band and located adjacent the pivotal point of the arm, a lever pivotally supported below the arm and having its upper end operatively connected thereto, a weight connected to the upper end of the lever and urging the lever in a direction to place a strain upon the arm to tension the brake band on the head, a weighted element, a connection from said weighted element to the brake band, the weighted element acting to urge the brake band in a direction reverse to the direction of rotation of the head, and a positive connection from said weighted element to the lower end of said lever whereby as the weighted element is drawn upward by the rotation of the brake band with the head, the upper end of the lever will be shifted in a direction to release said arm and relieve tension on the brake band.

6. The combination with a let-off beam having heads on its opposite ends, of brake bands embracing one of the heads, an arm pivoted to one end of each brake band and having an operative connection to the other end of each brake band, a lever pivotally mounted beneath each arm and having its upper end operatively connected to the free end of the corresponding arm, a weight for each lever urging the upper end of the lever in a direction away from the arm to

thus apply the corresponding brake band, a flexible connection attached to each brake band, a weight bar supported by said flexible connections, detachable weights disposed upon said bar, said bar and the weights urging both brake bands in a direction reverse to the direction of movement of the heads, and a positive connection between the weight bar and the lower ends of each of said levers acting as the weight bar moves upward to lift the first named weights and relieve strain on the arms and tension on the brake bands.

7. The combination with a let-off beam having a flanged head, of a brake band composed of a plurality of plies of textile fabric, the brake band being transversely flat and bearing across its whole width against the head, the brake band being interrupted at one point, an arm pivoted to one end of the brake band, an operative connection between the other end of the brake band and the other adjacent its pivotal point, a weight, a connection from said weight to the free end of the arm, the weight acting to apply the brake, one of said plies of flexible material extending over the upper face of the brake band and then extending downward from a point diametrically opposite the interruption in the brake band, a weight attached to said depending ply, and an operative connection entirely independent of the brake band and arm and extending from said depending ply to the first named weight and acting to lift the first named weight and relieve the tension on the arm when the brake band rotates with the head.

8. In a mechanism of the character described, a rotatable member, a brake band embracing the rotatable member, an arm pivoted at one end of the brake band, an operative connection between the other end of the brake band and said arm adjacent the pivotal point thereof, the brake band being free to rotate with the rotatable member when the brake is applied, gravity actuated means operatively engaging said free end of the arm and urging the brake to applied position, gravity actuated means resisting the rotation of the brake band with the member, and means entirely independent of the brake band and arm operatively connecting the last named gravity actuated means with the first named gravity actuated means acting to lift the first named gravity actuated means relative to the arm to thereby release the brake arm and relieve the tension on the brake when the second named gravity actuated means is moved upward by a rotation of the brake band with said member.

9. The combination with a let off beam having a head, of a brake band embracing the head, a weight urging the band toward a closed brake applying position, gravity actuated means urging the brake band bodily in a direction reverse to the direction of rotation of the beam, and means entirely independent of said weight positively supporting the weight against further downward movement immediately that the band has moved a predetermined distance with the head to thereby relieve the tension on the brake band under the action of the first named means when the brake band is shifted in the direction of rotation and with the beam.

10. The combination with a let-off beam having a head, of a brake band embracing the head, an arm pivoted to one end of the brake band, a connection between said arm and the opposite end of the brake band, said connection being disposed between the pivot of the arm and the free end thereof, means urging the arm in a direction

to tighten the brake band on the head and means entirely independent of the arm rendering said urging means inoperative immediately that the band has moved a predetermined distance with the head to thereby relieve the tension on the brake band.

11. The combination with a let-off beam having a rotatable head, of a brake band embracing the head, an arm pivoted at one end to one end of the brake band and having an operative connection adjacent said pivot to the other end of the brake band, a weight urging the arm in a direction to apply the brake band and tighten it upon the rotatable head, a second weight resisting rotation of the brake band with the rotatable head when the brake band is tightened, and means independent of the arm acting automatically to positively prevent further downward movement of the first-named weight and of the arm immediately that the brake band tends to

move with the rotatable head to thus release the brake band.

12. The combination with a let-off beam having a head, of a brake band embracing the head and having its ends spaced apart, a lever pivoted to one end of the brake band and operatively connected adjacent said pivot to the other end of the brake band, a weight operatively connected to said lever and normally urging the ends of the brake band toward each other to tighten the band around the head, means independent of the brake band and lever automatically relieving the pull of said weight on said lever upon an initial movement of the tightened brake band with the head, and means urging the brake band in a direction reverse to the direction of movement of the beam and head and acting to shift the brake band in this reverse direction until the brake band has again tightened upon the head.

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