Oct. 13, 1931. H. A. DAVIS 1,827,712

LET-OFF MECHANISM FOR LOOMS

Filed Dec. 31, 1929 2 Sheets-Sheet 1

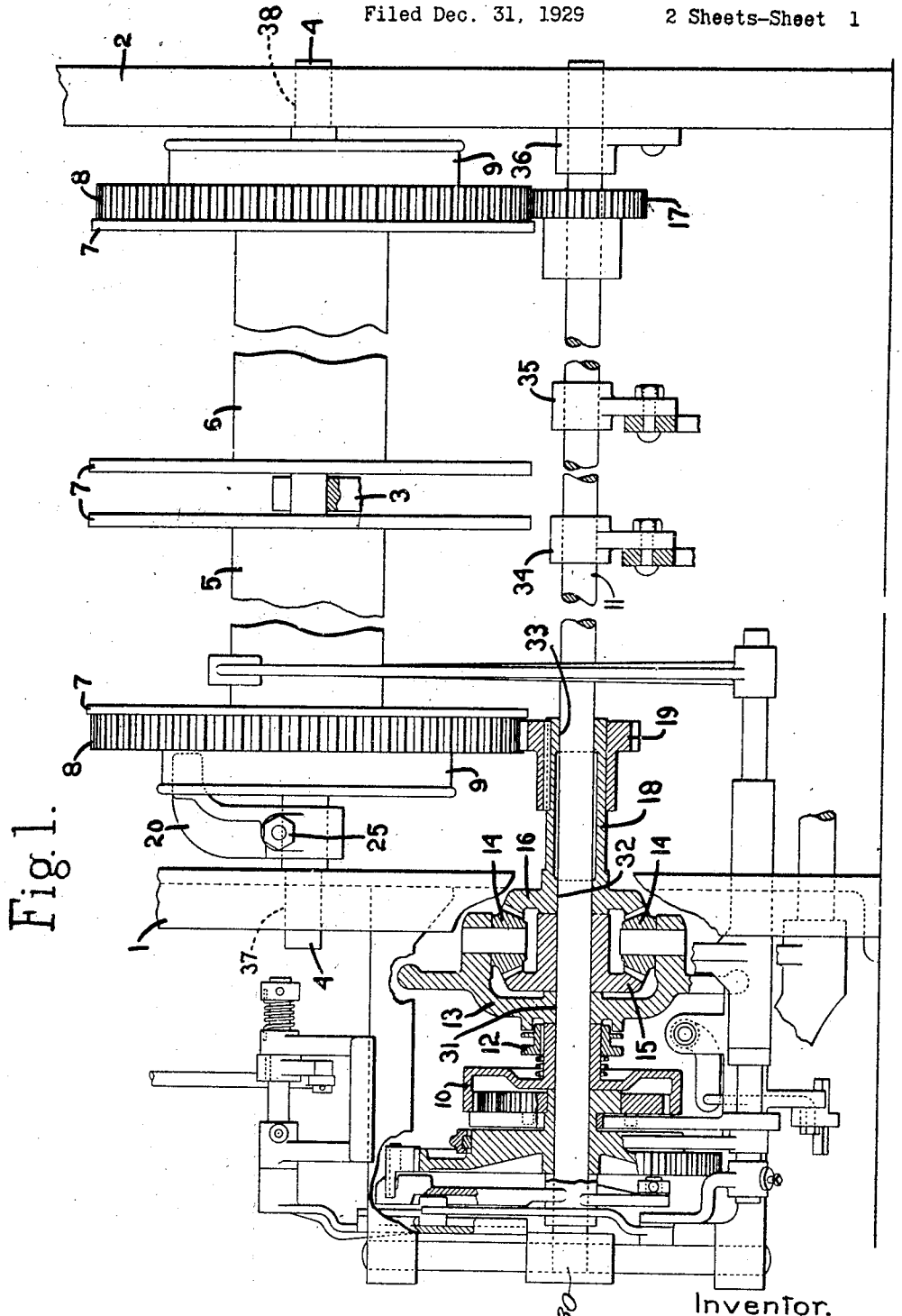


Fig. 1.

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Fig. 2.

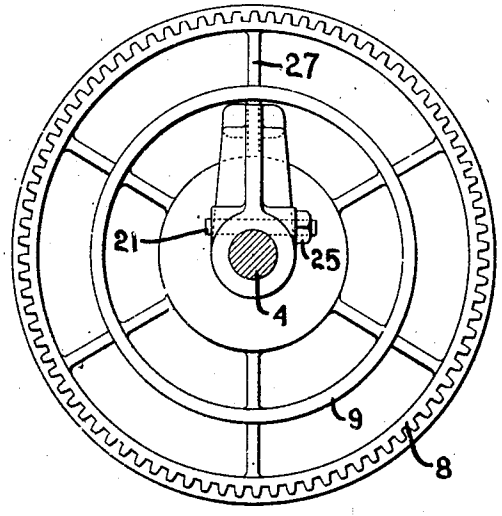


Fig. 3.

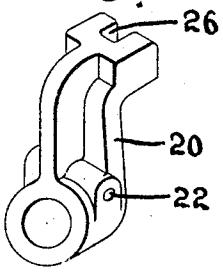
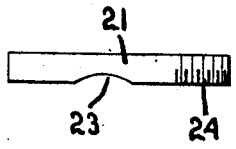


Fig. 4.



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UNITED STATES PATENT OFFICE

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LET-OFF MECHANISM FOR LOOMS

Application filed December 31, 1929. Serial No. 417,689.

This invention relates to a let-off mechanism for a loom having two warp beams, as in the case of a broad or wide loom where the warp is divided between two beams arranged in axial alignment.

Heretofore let-off mechanisms have been provided for this type of loom in which the let-off mechanism has acted through differential driving connections between it and the two warp beams thus automatically to equalize the tension on the warps on both beams and throughout the entire warp sheet. Such a mechanism of a highly improved type is shown in my Patent No. 1,749,131, granted March 4, 1930. It has been found that in order to utilize to full advantage the benefits of the differential drive the component parts thereof must be designed to evenly distribute the driving force to the two beams. If such a symmetrical condition does not exist, one beam will be driven faster than the other resulting in an uneven tension existing between the two warp beams.

The object of the invention is to provide means which shall act to oppose any tendency of one beam to be driven faster than the other.

The nature and objects of the invention will appear more fully from the accompanying description and drawings, and will be particularly pointed out in the claims.

Since the invention relates only to one feature of the operation of a differentially driven two-beam mechanism, it will only be necessary to illustrate and describe in detail those parts of such a mechanism with which the invention is directly concerned. The drawings for this purpose illustrate a mechanism such as shown in my aforesaid Patent No. 1,749,131.

In the drawings:

Fig. 1 is a view partially broken away and partially in vertical section looking from the front of the loom toward the warp beams, their support, and the let-off mechanism.

Fig. 2 is an end view of one of the warp beams.

Fig. 3 is a dog for securing one of the warp beams to the supporting shaft.

Fig. 4 is a side elevation of a clamping bolt for the dog.

In the construction illustrated, the side frames 1 and 2 of the loom and an intermediate support 3 are each provided with aligned journal bearings in which is supported the beam supporting shaft 4. The two warp beams 5 and 6 are journalled on the shaft 4 and are shown as of the usual form having the heads 7. The outer head of each warp beam has secured or formed thereon the large gear 8 and preferably also the drum 9 to receive the usual friction band.

The let-off mechanism is shown as of the type of the well known Draper-Roper let-off mechanism disclosed in Patent No. 647,815, granted April 17, 1900, and in my aforesaid patent. As this mechanism is not specifically concerned with the present invention, it is unnecessary to describe it in detail. It is sufficient to note that this mechanism acts positively to rotate the internal gear 10 journalled on the shaft 11 which extends transversely of the loom. This gear has keyed thereto a clutch element 12 by means of which it may be connected to or disconnected from the differential drive. This mechanism is shown as comprising a rotary element 13 driven by the gear 10 and journalled on the shaft 11. This element has journalled thereto on axes extending radially of the shaft 11 one or more pinions 14 herein shown as two in number. These pinions mesh with a pair of gears 15 and 16. The gear 15 is keyed to the shaft 11 and the shaft 11 has secured thereto a pinion 17, shown as meshing with the gear 8 of the right-hand beam 6, viewing Fig. 1. The gear 16 forms part of or is secured to a sleeve 18 journalled on the shaft 11 and has keyed to its end a pinion 19 shown as meshing with the gear 8 of the left-hand warp beam 5, viewing Fig. 1. It is to be understood, however, that any suitable means may be employed other than the well known Draper-Roper let-off to drive the element 13 of the differential mechanism.

If a greater resistance is met in driving the shaft 11 than that encountered in driving the sleeve 18, there is a resulting tendency for the latter to be driven faster than the former

when let off occurs thus causing an unequal tension throughout the warp sheet. In the design of a loom of this type it is practically impossible to build a differential drive in which the frictional resistance of the elements driving one of the beams will be equal to the frictional resistance of the elements driving the other beam. Consequently, the beam driven by the elements having the least friction is driven faster than the other beam when let off takes place.

The difference in the degree of friction existing in the train of mechanism driving the two beams may be illustrated in the embodiment herein shown by pointing out the relatively greater number of bearings in which the shaft 11 turns as compared to the bearings of the sleeve 18. Within the let-off mechanism itself the rotation of the shaft 11 is resisted by the friction of the bearings 30, 31, 32 and 33. The relatively great length of the shaft necessitates the use of two intermediate supporting bearings 34 and 35 while its extreme end must be supported in the bearing 36 on the loom side 2. On the other hand, the sleeve 18 carrying the beams 16 and 19 rotates on the shaft 11 at two bearings only, namely 32 and 33. Obviously, under normal conditions it consumes more power to drive the shaft 11 than the sleeve 18 which results in an inequality of drive to the two beams.

It is the purpose of the present invention to provide means to oppose this tendency of one beam to be driven in advance of the other. In the embodiment herein shown the resistance to drive will normally be greatest at the shaft 11 due to the greater number of bearing points in which it must turn. It may be found, however, when the machine is assembled that the tendency will be to drive the beam 6 faster than the beam 5. For structural reasons it is difficult to reduce the friction on the shaft 11 which drives the beam 6. It is, however, practical to introduce friction in the drive of the beam 5, and in this manner equalize or offset an excessive variance in the resistance offered by the shaft 11. If, as above pointed out, the excessive resistance should appear in the train of mechanism which drives the beam 5, means must be provided to offset this undesirable resistance by adding resistance to the train of mechanism driving the beam 6.

Specifically this result is secured by locking either one or the other of the beams to the shaft 4. The device shown as provided for this purpose is a dog 20 fitting the shaft 4 and adjustable longitudinally thereof and provided with means by which it may be clamped to the shaft in any desirable position of longitudinal adjustment. Such means is shown as a screw 21 fitting a transverse bore 22 in the dog and having a cut away portion 23 to fit over the shaft 4. This bolt is threaded at 24 and provided with a nut 25 by means of which, when the dog is in position, it may be locked to the shaft by tightening up the nut 25. At its free end the dog is shown as provided with a groove 26 adapted to fit over a radial rib 27 on the beam thus rendering the dog connectible and disconnectible from the beam, but any suitable means may be provided for connecting the dog to the beam or, in fact, for connecting the beam to the shaft.

The function of the dog 20 and its application to the principle of the invention is as follows. It is assumed in the specific instance herein presented that the beam 5 is being driven faster than the beam 6 due to an excessive resistance offered by the shaft 11. Any rotation of the beam 5 must rotate the dog 20 which in turn rotates the shaft 4 thus introducing an additional load upon the train of mechanism which drives the beam 5. Such load is due to the friction between the shaft 4 and the three main bearings thereof 37 and 38 in the loom sides and the center bearing 3 in which the shaft must now rotate.

A positive resistance is thus introduced in a very simple and effective manner to offset the excessive drag on the shaft 11 and cause the two beams to be driven evenly and differentially.

Without going further into detail, it will be seen that when the gear 10 is clutched to the element 13 and the let-off mechanism is acting positively to rotate the gear 10, the two beams will be driven forward through the differential mechanism so as to equalize the tension throughout the warp sheet.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A let-off mechanism for a loom having two warp beams comprising a positively rotated let-off member, a shaft journalled in the loom frame and having both warp beams journalled thereon, differential driving connections between the let-off member and both warp beams whereby the tension on the warp on both beams is continuously equalized and means acting to oppose any tendency of one beam to be driven faster than the other due to unequal resistance offered to said driven let-off member by said differential driving connections.

2. A let-off mechanism for a loom having two warp beams comprising a positively rotated let-off member, a shaft journalled in the loom frame and having both warp beams journalled thereon, differential driving connections between the let-off member and both warp beams whereby the tension on the warp on both beams is continuously equalized, and means connecting one of the warp beams to the shaft thus to cause a tendency of said beam to be driven faster than the other to

be opposed by the resistance set up by the additional power required to turn the normally non-rotating shaft.

3. A let-off mechanism for a loom having two warp beams comprising a positively rotated let-off member, a shaft journalled in the loom frame and having both warp beams journalled thereon, differential driving connections between the let-off member and both warp beams whereby the tension on the warps on both beams is continuously equalized, and a dog secured to the shaft and engaging one of the warp beams to cause the said beam and the shaft to rotate together in either direction whereby any tendency of said beam to be driven faster than the other is opposed by the frictional resistance resulting from the drive established by said dog between said beam and the shaft.

4. A let-off mechanism for a loom having the construction defined in claim 3, in which the dog is longitudinally adjustable on the shaft and is connectible and disconnectible with the warp beam by adjustment on the shaft toward and from the warp beam respectively.

5. A let-off mechanism for a loom having two warp beams comprising a gear on each beam, a beam shaft journalled in the loom frame and having both warp beams journalled thereon, a driving shaft having a pinion meshing with the gear on one beam, a driving sleeve journalled on the driving shaft and having a pinion meshing with the gear on the other beam, a pair of gears secured one on the driving shaft and the other on the driving sleeve, a rotary driven element carrying a pinion meshing with said pair of gears and acting to drive them and consequently the two beams differentially to let off the warps on the two beams under a continuously equalized tension, and means connecting the beam driven the faster to the normally non-rotating shaft acting to oppose any tendency of said beam to be driven faster than the other.

6. A loom comprising let-off mechanism, two warp beams journalled independently in axial alignment, differential driving connections between the let-off mechanism and both warp beams whereby the tension on the warps on both beams is continuously equalized, and means acting to oppose any tendency of one beam to be driven faster than the other by said driving connections.

In testimony whereof, I have signed my name to this specification.

HARRY A. DAVIS.