H. F. LIVERMORE.

HEAD MOTION FOR LOOMS.

APPLICATION FILED JAN. 22, 1912.

1,053,307.

Patented Feb. 18, 1913.

2 SHEETS—SHEET 1.

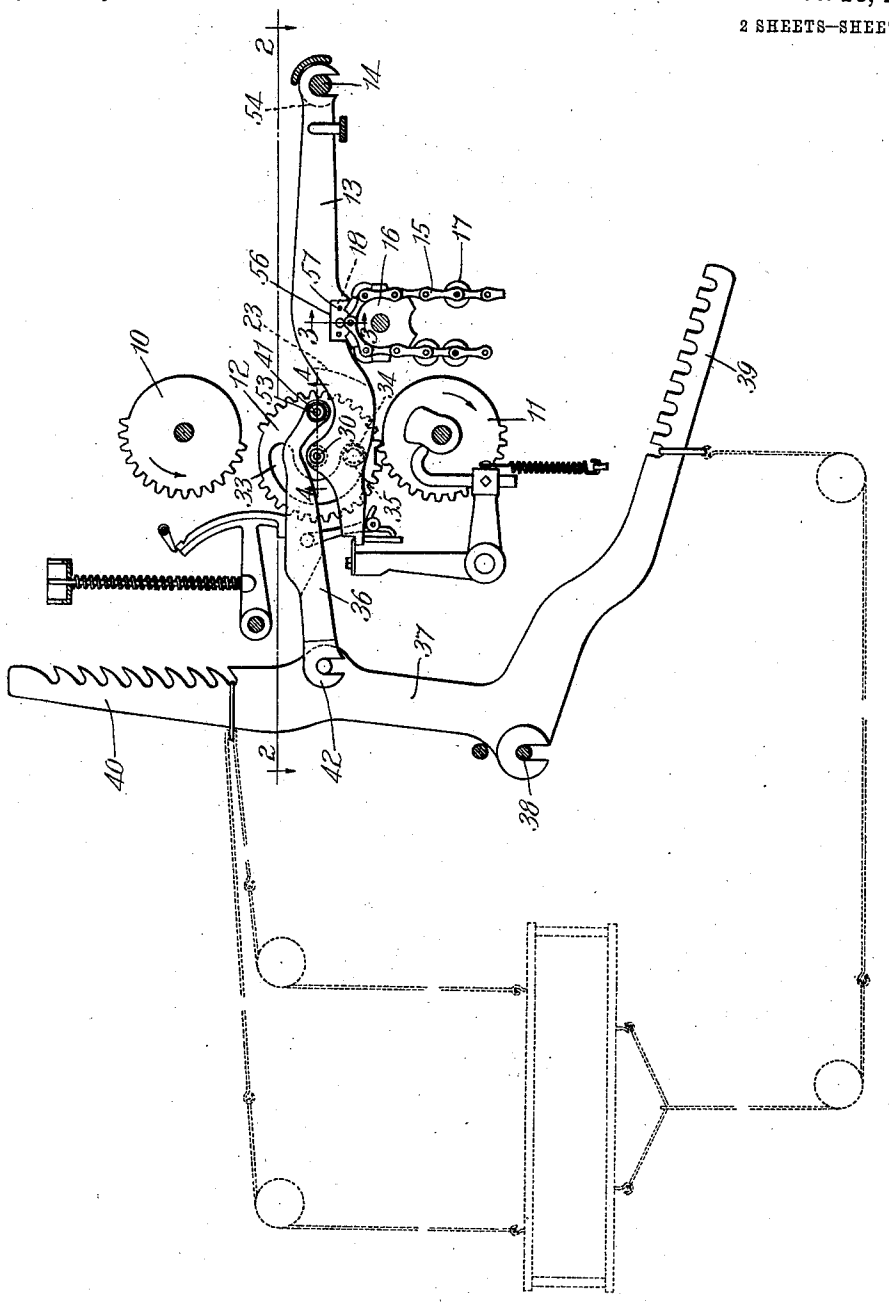

Fig. 1.

Witnesses.

John P. Hutchison

Franklin E. Low

Inventor.

Homer F. Livermore

by his attorney, Charles J. Goodwin

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

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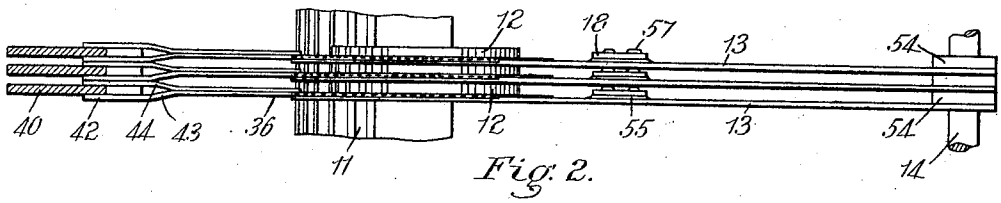

Fig. 2.

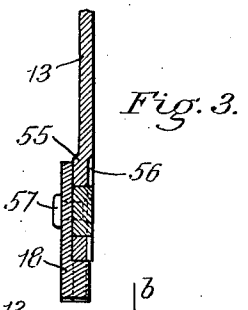

Fig. 3.

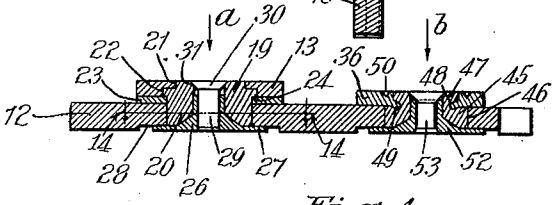

Fig. 4.

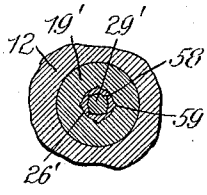

Fig. 14.

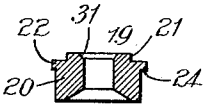

Fig. 9.

Fig. 5.

Fig. 6.

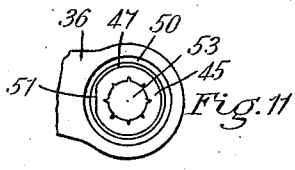

Fig. 11.

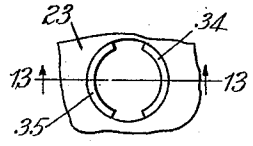

Fig. 12.

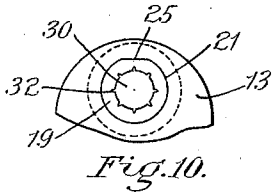

Fig. 10.

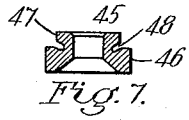

Fig. 7.

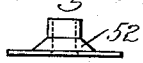

Fig. 8.

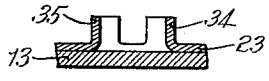

Fig. 13.

Witnesses.

John P. Aitchison

Franklin E. Low.

Inventor:

Homer F. Livermore

by his attorney Charles V. Goodin.

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HOMER F. LIVERMORE, OF BROOKLINE, MASSACHUSETTS.

HEAD-MOTION FOR LOOMS.

1,053,307. Specification of Letters Patent. Patented Feb. 18, 1913.

Application filed January 22, 1912. Serial No. 672,576.

To all whom it may concern:

Be it known that I, HOMER F. LIVERMORE, a citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Head-Motions for Looms, of which the following is a specification.

This invention relates to improvements in head motions for looms and is designed to overcome the troubles usually associated with devices of this character now in general use. The vibrator lever together with the connector is usually constructed of cast-iron and owing to the extreme thinness of the metal used which is necessitated by the limited amount of space into which a large number of the devices have to be placed, the life of said parts is very short, breakage occurring often and thereby rendering the device expensive and causing a great deal of annoyance.

The object of the invention is to provide a mechanism which may be constructed of suitable sheet material and which will be adapted to withstand stresses and strains naturally imposed upon devices of like character in a manner far superior to that of the devices now in general use.

The object is further to provide a mechanism having connections and pivots which are adapted to occupy a minimum amount of space and which will not work loose or break under the ordinary amount of work applied thereto.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is a detail sectional view showing the essential working parts of a well-known type of head motion for looms embodying my invention and showing its connection with a loom harness in dotted lines and very much reduced in size. Fig. 2 is a detail plan section taken on line 2—2 of Fig. 1 showing a plurality of vibrators in their relative positions. Fig. 3 is an enlarged detail section taken on line 3—3 of Fig. 1. Fig. 4 is a section part elevation taken on line 4—4 of Fig. 1. Figs. 5 to 8 inclusive are detail views of the parts shown in the section at the right of Fig. 4 with said parts as they would appear before assembling. Fig. 9 is a detail section of the stud embodied in the section at the left of Fig. 4. Fig. 10 is a detail elevation of the stud shown at the left of Fig. 4 as viewed in the direction of the arrow A with the lever broken away to save space. Fig. 11 is a view of the device shown at the right of Fig. 4 as viewed in the direction of the arrow B with the connector broken away to save space. Fig. 12 is a detail side view of the stops formed on the vibrator lever and adapted to engage the semicircular slot in the vibrator gear, said lever being shown broken away. Fig. 13 is a section taken on line 13—13 of Fig. 12. Fig. 14 is a detail section taken on line 14, 14 of Fig. 4 which illustrates a modified form of the pivot shown in Fig. 4.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings 10 and 11 represent a pair of cylinder gears of a well known type of head motion and which are adapted to be rotated in the direction of the arrows shown in connection therewith by means not shown in the drawing, but well known to those skilled in the art. The head motion of the class illustrated in said drawings is adapted to be used in connection with looms having a large number of harnesses, as for instance, when weaving woolen or worsted fabrics some looms employ as many as 36 harnesses, each of said harnesses requiring a different operating mechanism. It will therefore be evident in view of this fact that it will be necessary to have a device which occupies a very small amount of space as otherwise a loom having such a large number of harnesses would require too much room. To this end I have employed a mechanism having a vibrator gear 12 formed of sheet material which is rotatably mounted upon a vibrator lever 13 also formed of sheet material and fulcrumed on a rod 14.

A vibrator gear 12 is located intermediate the cylinder gears 10 and 11 and is adapted to be moved alternately into and out of engagement with said cylinder gears by a pattern chain 15 which is supported by a chain cylinder 16. The chain cylinder 16 is rotated by suitable mechanism not shown in the drawing whereby the risers 17 which are carried by said chain are brought into contact with the run 18.

It will be obvious that with a chain of the character shown in said drawings, the

portion of the lever 13 against which the risers 17 contact will be subjected to a great deal of wear. It has therefore been found necessary to provide a device commonly called a run or a chill, which is formed of hardened material and has a face thereon wider than is the edge of the lever 13 and usually riveted to said lever. This device is usually placed upon the same side of the lever 13 as that upon which the gear 12 is located.

Referring to Figs. 2, 4, 9 and 10, the vibrator gear 12 is pivotally mounted upon a tubular stud 19 having a body portion 20 and a smaller portion 21, said stud also having a flange 22 located upon the body portion of said stud adjacent to the smaller portion 21. The smaller portion 21 and the flange 22 are adapted to project into corresponding holes formed in the lever 13 and a plate 23 preferably identical in contour with the end of the lever 13 adjacent to said vibrator gear is preferably permanently secured to said lever by an electric welding process, the inner face of said plate engaging the outer cheek 24 of the flange 22, thereby preventing said stud from being removed from the lever 13. To doubly secure said stud and prevent rotation thereof the smaller portion 21 of the stud 19 is flattened at 25 and the hole into which it projects correspondingly formed. The vibrator gear 12 which is mounted on said stud 19 is retained in its rotatable engagement therewith by a tubular rivet 26 provided with an enlarged disk shaped head 27 which engages said gear within a counterbore 28 which is substantially equal in depth to the thickness of said disk shaped head, thus bringing the outer face of said head in alinement with the outer surface of said gear, and a rivet 29 having a flat head 30 which preferably engages the countersunk end 31 of the stud 19 is securely riveted at its opposite end against the head of the tubular rivet 26.

The countersunk end 31 of the stud 19 is preferably scored as at 32 and upon the riveting of the rivet 29, the head 30 is forced against and into said scoring thereby preventing said rivet from rotating within the stud 19 in case it should become slightly loosened by the constant wear and vibration of the moving parts.

The gear 12 is provided with a semicircular slot 33 into which the projections 34 and 35 extend. These projections are preferably formed integral with the vibrator lever 13 or with the plate 23 which is secured thereto and form as it were a cylindrical stud. The projection 34 engaging one end of said slot 33 and the projection 35 engaging the opposite end of said slot and thereby limiting the rocking movement of said gear upon said lever 13 and causing it to stop at the desired point in order to insure the teeth on said gear properly meshing with the teeth on the cylindrical gears 10 and 11.

The vibrator gear 12 is in turn connected through a connector 36 to a harness jack 37 which is pivoted at 38 and is formed in the shape of a bell crank lever having arms 39 and 40. These arms being connected, in a manner well known to those skilled in the art, to their respective harnesses.

The connector 36 is formed of malleable material such as cold rolled steel and is pivotally connected at 41 to the gear 12 and at 42 separably and pivotally to the harness jack 37. The end 42 of said connector is preferably forked, one of the legs thereof being formed integral with the body of said connector and offset at 43 while the other leg thereof is formed of the same material and is secured to the body of said connector preferably by an electric welding process, whereupon a permanent connection is formed between said legs, this leg is also offset at 44 thereby bringing the center of the space between said legs in alinement with the face of the connector engaging the gear 12 or in other words in alinement with the inner face of said gear.

The opposite end 41 of the connector 36, when said connector is formed of cast-iron has usually cast thereon a projection which forms the pivotal connection between said connection and said gear. A great deal of trouble is often caused by this connection breaking off next to the connector, but with a steel connector of applicant's type a stud of stronger and harder material may be employed. The stud 45 is shouldered and has a body portion 46 pivotally engaging the gear 12 (see Figs. 1, 4, 5, 6, 7, 8 and 15) said stud also has a smaller portion 47 adapted to engage said connector and is provided with an annular recess 48 which is preferably disposed at a point adjacent to the juncture of said body and smaller portions and oblique to the medial axial line of said stud, and by reason of the oblique disposition of said recess it is possible to cut said recess much deeper than would be possible in case the same were formed within the smaller portion of said stud at right angles to said median axial line, as in this case the end of said smaller portion would be almost entirely cut through. The connector 36 has formed thereon, after the smaller portion of said stud has been inserted within the hole in said connector, a flange 49, by swaging the material adjacent to said hole into the annular recess 48 formed in said stud and forms a second annular recess 50 in the outer face of the connector 36. By the peculiar angle of the flange 49 the metal of the connector 36, which surrounds the smaller portion of the stud 45, is prevented from expanding or being forced apart by the strain upon said stud as well as being prevented

from moving longitudinally of said stud. With this combination it will be possible to employ a hardened stud and thus prolong the life of the connector.

A relative rotation between the stud 45 and the connector 36 is prevented by the flattened face 51 on said stud, as the metal around said stud is formed to correspond with said flattened face by the swaging operation hereinbefore referred to. A rotatable engagement between said stud and the gear 12 is maintained by the tubular rivet 52 and rivet 53 which are preferably connected in the same manner as are the rivets 26 and 29 in the stud 19.

Referring to Figs. 1 and 2 it will be noted that the distance between the outer faces of the legs of the forked end 36 is equal to the distance between the outer face of the vibrator lever 13 and the opposite face of the vibrator gear 12 and furthermore said distance is equal to the thickness of the lever 13 and boss 54, said boss being formed by electrically welding the hub 54 to the face of said lever upon which the plate 23 is welded.

It is essential that the center line of the harness jack and of the risers 17 should both be in alinement with a plane passing through the center of the hub 54, containing the face to which the run 18 is secured and also containing the inner face of the gear 12 which contacts with the face of the lever 13. A plane containing the face of the run 18 which engages the lever 13 substantially bisects the face of said run against which the risers 17 contact, therefore in order that the face on the lever 13 which engages said run shall be in alinement with the inner face of the gear 12, it will be necessary to offset the lever 13 as at 55 (see Fig. 3) this offset forming a recess 56 which contains the heads of the rivets 57. The pivotal connection hereinbefore described, as for instance, the stud 19 between said vibrator gear 12 and the vibrator lever 13 is a substantially permanent connection and is designed to wear as long, and possibly longer, than the other parts of the device. One feature which is particularly necessary to the solidity and durability of said pivots is that the means for retaining said members in rotatable engagement, one with the other, are so constructed and so firmly riveted together that a relative movement therebetween will be impossible. As hereinbefore described this is prevented by forcing the head of the rivet 30 into the scorings 31 formed in the stud 19 by the upsetting of the opposite ends of the rivet 29 against the head of the rivet 26, provided said rivet 29 does not become loosened by the excessive strain of the moving parts and permit the head 30 from becoming disengaged from the scorings 31. To doubly insure the prevention of a relative movement between said members, I have shown in Fig. 14 as a modified form, a rivet 29′ provided with corrugations 58, 58 which engage corresponding recesses in the interior of the tubular rivet 26′ coöperating with the corrugations or scorings 31, and preventing rotation between said rivet 29′ and tubular rivet 26′ and also between said rivets and the stud 19′. In addition to this the tubular rivet 26′ may also be provided with projections 59 which will engage corresponding depressions formed within the stud 19′. The same construction as just described is also applicable to the stud 45, tubular rivet 52 and rivet 53. If for any reason it is found necessary to disconnect said members, which would be the case if any of said members became injured, the same may be accomplished by drilling into the ends of the rivets 29 and 53 at the upset ends thereof and forcing the same from their positions within the tubular rivets 26 and 52. In removing a vibrator mechanism from said head motion the vibrator lever 13 is removed from the rod 14 and the connector 36 separated from the arm 40 of the harness jack 37 whereupon the whole mechanism may be withdrawn.

Although I have shown and described my invention as being particularly adapted to head motions for looms, it must be seen that it need not and should not be restricted exclusively to machines of this class.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. A head motion for looms embodying, in its construction, a vibrator gear, a connector, a shouldered stud having a body portion adapted to rotatably engage one of the aforesaid members, said stud also having a smaller portion adapted to engage the other of said members and provided with an annular recess oblique to the median axial line of said stud, and disposed therein at a point adjacent to the junction of said body and smaller portions, a corresponding flange on said connector projecting into said recess, and means adapted to retain said body portion and the member rotatably mounted thereon in rotatable engagement one with the other.

2. A head motion for looms embodying, in its construction, a vibrator gear, a connector formed of malleable material, a tubular stud having a body portion adapted to rotatably engage one of the aforesaid members, said stud also having a smaller portion adapted to engage the other of said members and provided with an annular recess, oblique to the median axial line of said stud, and disposed therein at a point adjacent to the junction of said body and smaller portions, corresponding flange formed on said second member projecting into said recess, a tubular rivet adapted to

engage the interior of said tubular stud, and a second rivet adapted to secure said tubular rivet within said tubular stud whereby said body portion and said first member are retained in rotatable engagement one with the other.

3. A head motion for looms embodying, in its construction, a vibrator gear, a connector formed of malleable material, a tubular stud having a body portion adapted to rotatably engage one of the aforesaid members, said stud also having a smaller portion adapted to engage the other of said members and secured thereto, a tubular rivet adapted to engage the interior of said stud, a second rivet adapted to fasten said stud and said tubular rivet together, and means on said second rivet adapted to engage recesses in said tubular stud, whereby a relative rotary movement between said tubular stud and said second rivet is prevented.

4. A head motion for looms having, in combination, a vibrator gear, a vibrator lever adapted to rotatably support said gear, a stud having a body portion adapted to rotatably engage one of the aforesaid members, said stud also having a smaller portion projecting into a corresponding hole in the other of said members, a flange on said body portion adjacent to said smaller portion adapted to engage a recess in said other member, a plate adapted to be permanently secured to said other member adjacent to said stud, to engage said flange, whereby said stud is locked within said hole, and means adapted to retain the body portion of said stud and the member rotatably mounted thereon in rotatable engagement one with the other.

5. A head motion for looms having, in combination, a vibrator gear, a vibrator lever adapted to rotatably support said gear, a stud having a body portion rotatably engaging one of the aforesaid members, said stud also having a smaller portion of irregular shape projecting into a correspondingly shaped hole in the other of said members, a flange on said body portion adjacent to said smaller portion also engaging a hole in said other member, and a plate permanently secured to said other member adjacent to said stud, and engaging said flange, whereby said stud is locked within said hole.

6. A head motion for looms having, in combination, a vibrator gear, a vibrator lever adapted to rotatably support said gear, a tubular stud having a body portion rotatably engaging said gear, said stud also having a smaller portion projecting into a corresponding hole in said lever, a flange on said body portion adjacent to said smaller portion projecting into a corresponding recess in said lever, a plate adapted to be permanently secured to said lever adjacent to said stud, and engage one cheek of said flange, whereby said stud is locked within said hole and a rivet adapted to be riveted in said tubular stud to retain said gear in rotatable engagement therewith.

7. A head motion for looms having, in combination, a vibrator lever, a flanged tubular stud, one end of said stud and said flange projecting into a correspondingly shaped hole and recess respectively in said lever, a plate adapted to be secured to said lever, and engage the outer cheek of said flange, a vibrator gear rotatably mounted on the outer end of said stud, a tubular rivet adapted to engage the interior of said tubular stud, a rivet adapted to secure said tubular rivet within said tubular stud and means adapted to lock said rivet and stud together, whereby a relative rotation therebetween is prevented.

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

HOMER F. LIVERMORE.

Witnesses:
FRANKLIN E. LOW,
SYDNEY E. TAFT.