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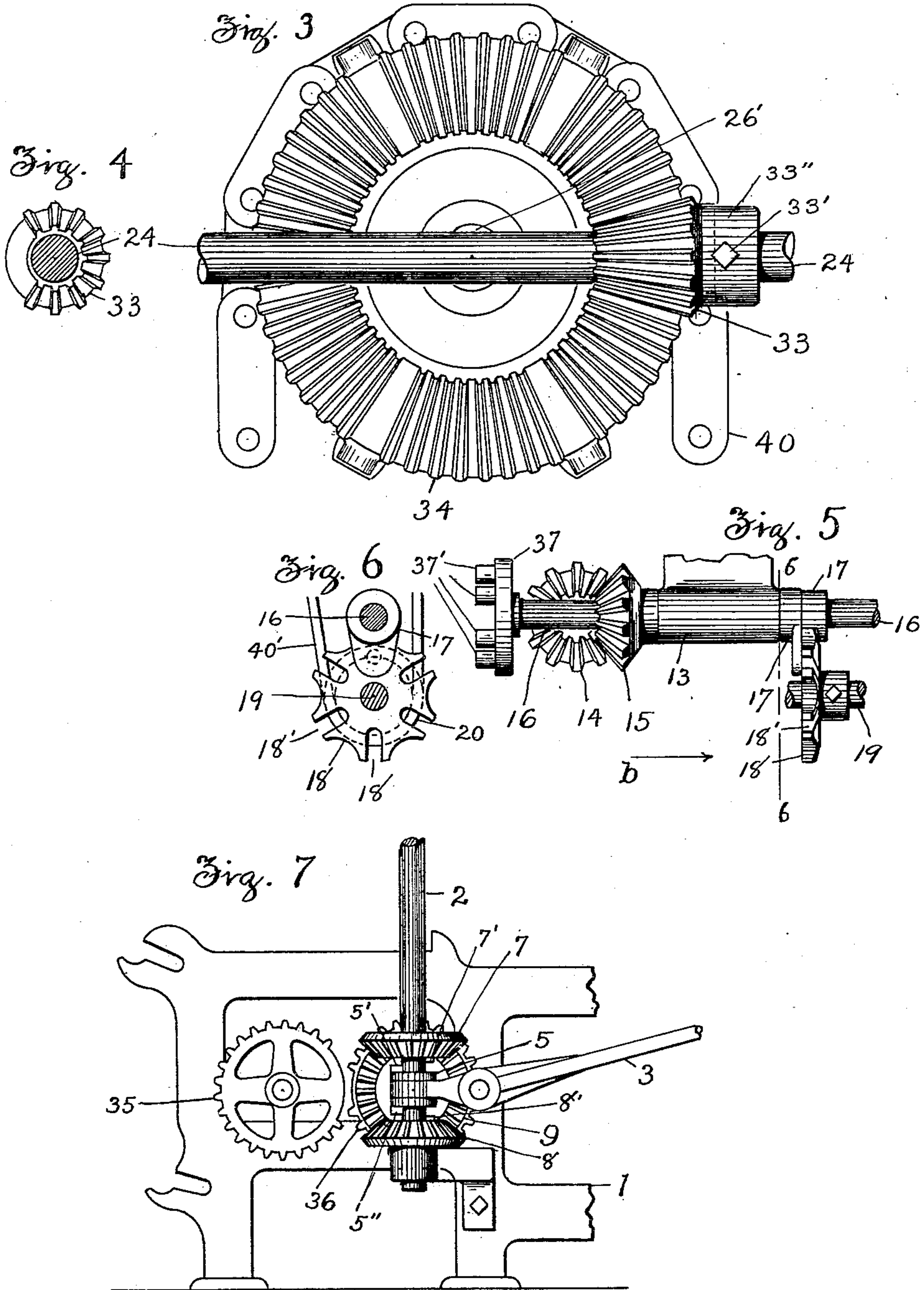
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H. WYMAN & G. F. HUTCHINS.
LOOM FOR WEAVING MOQUETTE CARPETS.

(Application filed Jan. 22, 1901.)

(No Model.)

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LOOM FOR WEAVING MOQUETTE CARPETS.

SPECIFICATION forming part of Letters Patent No. 677,302, dated June 25, 1901.

Application filed January 22, 1901. Serial No. 44,284. (No model.)

To all whom it may concern:

Be it known that we, HORACE WYMAN and GEORGE F. HUTCHINS, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have jointly invented certain new and useful Improvements in Looms for Weaving Moquette Carpets, of which the following is a specification.

10 Our invention relates to looms for weaving moquette carpets or other tufted fabrics in which the spool-frames or tuft-spools are carried in two endless chains, which are supported on a series of sprocket wheels or carriers. The tuft-spools are removed in succession from the chains and replaced after inserting the tufts by what are termed "transferring-arms."

20 The object of our invention is to provide improved means for supporting and moving the main portion of the chains carrying the spool-frames and also the secondary portion from which the spool-frame is removed and replaced by the transferring-arms.

25 The number of spool-frames used in looms of the class above referred to is very large, often several thousand, so that a great length of endless chain for each end of the spool-frames is required, which as heretofore used is extended in a horizontal plane and supported on a series of sprocket wheels or carriers, except that portion of the chain from which the spool-frames are to be removed and replaced, which extends down in a loop over the loom and passes around one pair of sprocket-wheels. The length of the main portion of the endless chains carrying spool-frames is so great that a great deal of room is required to extend the chain, and one feature of our invention relates to the construction and arrangement of the chain mechanism to economize space. We place the pairs of sprocket wheels or carriers over which the lower runs of the two endless chains carrying the spool-frames pass quite close together and have a slack in the chains which hang down in the form of free loops between the sprocket wheels or carriers of any length desired. The weight of the main portion of the endless chains carrying the spool-frames

is very great, and considerable power is required to move the chains, and the means heretofore ordinarily employed for moving the chains as the loom operates have not been satisfactory, and another feature of our invention relates to our improved means for moving the main portion of the endless chains.

In our improvements each pair of sprocket wheels or carriers supporting the lower runs of the main portion of the two endless chains carrying the spool-frames has a positive rotary movement communicated thereto independent of and without any drag of the chain ordinarily used to rotate the sprocket-wheels, so that a uniform and very steady movement is given to the main portion of the chains.

In our improvements an intermittent motion may be communicated simultaneously to all the pairs of sprocket-wheels carrying the lower runs of the main chains, so that they will all start and stop simultaneously, or each pair of sprocket-wheels may have an independent intermittent motion—that is, each pair may start and stop at a different time, though they will collectively have an intermittent motion. In this way much less power is required to move the chains.

In our improvements the secondary portion of the chain or that portion from which the tuft-spool is removed and replaced by the transferring-arms in the operation of weaving has a positive intermittent motion independent of the motion of the main portion of the chains above referred to.

Our invention consists in certain novel features of construction of our improvements, as will be hereinafter fully described.

We have shown in the drawings sufficient portions of a loom of the class above referred to (the construction and operation of which is well known) with our improvements combined therewith to enable those skilled in the art to which our invention belongs to understand the construction and operation of our improvements.

Referring to the drawings, Figure 1 is an end view of a loom-frame and our improved means for supporting and moving the endless chains carrying the spool-frames combined therewith. Fig. 2 is a detached detail showing

ing a single chain-supporting sprocket-wheel and gearing for moving the same. Fig. 3 shows a modified construction of the mechanism shown in Fig. 2. Fig. 4 is an end view of the small bevel-pinion shown in Fig. 3, showing the place where a number of the teeth are removed. Fig. 5 is a detail of the pin-wheel and star-wheel mechanism and driving-gears. Fig. 6 is a section on line 6 6, Fig. 5, looking in the direction of arrow *b*, same figure; and Fig. 7 shows a modified construction of the driving mechanism of the upright shaft shown in Fig. 1. Figs. 2 to 7, inclusive, are on an enlarged scale.

As our present invention relates only to the means for supporting and moving the endless chains carrying the spool-frames, we have not deemed it necessary to show in the drawings any of the working parts of the loom for weaving the fabric, as the same form no part of our present invention and may be of any usual and well-known construction used in the weaving of moquette carpets or other tufted fabrics.

In the accompanying drawings, 1 is the loom-frame. 2 is the upright vertical shaft, which may have at its lower end a clutch mechanism of any well-known construction to cause the shaft 2 to rotate in one direction or the other, as desired, and move the endless chains carrying the spool-frames forward or in the reverse direction. In this instance the clutch mechanism consists of a hand-lever 3, which is extended to the front of the loom, as shown in Fig. 1, and is pivoted at 4, and has a forked end 3', engaging the sleeve or collar 5, keyed on the vertical shaft 2 to raise or lower said collar and bring an extension 5' on the upper side thereof into engagement with a projection 7' on the bevel-gear 7, loose on the shaft 2 and in mesh with and driven by a bevel-gear 9, fast on a driven shaft, or to lower the collar 5 to bring an extension 5'' on its lower surface into engagement with a projection 8' on the bevel-gear 8, loose on the shaft 2 and in mesh with and driven by said bevel-gear 9, to turn the shaft 2 in one direction or the other to move forward or reverse the endless chains carrying the spool-frames, as desired.

If the collar 5 is moved into an intermediate position out of engagement with either bevel-gear 7 or 8, as shown in Fig. 7, the shaft 2 will be stationary and may be turned in either direction independent of the driving bevel-gear 9. A bevel-gear 10 is also fast on the shaft 2 and meshes with and drives the bevel-gear 11, fast on the shaft 12, supported in bearing 13 on the loom-frame. On the other end of the shaft 12 is a bevel-gear 14, which meshes with and drives the bevel-gear 15, fast on the shaft 16, and on the opposite end of said shaft 16 is a pin-wheel 17, (see Figs. 5 and 6,) which engages the slots 18' in the star-wheel 18, fast on the shaft 19, which is extended across the loom-frame and carries a pair of sprocket-wheels 20, only one of which is shown by dotted lines in Fig. 6, and

around which the lower looped ends of what we term the "secondary" chain 40', carrying the spool-frames 21, (see Fig. 1,) attached thereto in the ordinary way, extend and from which the spool-frames 21 are removed and replaced by the usual transferring means. (Not shown.)

The sprocket-wheels 20, around which the looped ends of the two endless chains pass, as above described, and which control the movement of the chains, constitute what we may designate as "secondary-chain-actuating" means. A regular intermittent motion is communicated to the sprocket-wheels 20 to move the looped portion of the chains passing around said sprocket-wheels by the star-wheel and pin-wheel mechanism, which motion is independent of the motion of the main portion of the chains, to be hereinafter described. The star-wheel 18 is fast on the shaft 19 of the sprocket-wheels 20, so a direct motion is communicated to said sprocket-wheels through the engagement of the star-wheel by the pin-wheel 17, which is driven positively from the upright shaft 2 through the bevel-gears 10, 11, 14, and 15, as above described. The movement of the pin-wheel 17 will be continuous if the shaft 2 revolves continuously or intermittent if the shaft 2 revolves intermittently.

Upon the upper end of the vertical shaft 2 is fast a bevel-gear 22, which meshes with and drives the bevel-gear 23, fast on the horizontal driven shaft 24. The shaft 24 is supported by hangers (not shown) and has thereon a series of worms 25, which are adjustable on said shaft relatively to their axes and secured thereon by a set-screw 25', extending in the side extension or hub 25'' on the worm 25. The number of worms 25 on the shaft 24 corresponds to the number of pairs of sprocket-wheels 26, over which the lower runs of what we term the "main" portion of the two endless chains carrying the spool-frames (not shown) extend and are supported, as shown in Fig. 1.

It will be understood that the sprocket-wheels 26 are arranged in pairs, as is customary, and each sprocket-wheel of a pair is fast on a shaft 26', which is supported in hangers 24', and over one of a pair of sprocket-wheels extends the lower run of one of the endless chains and over the other the lower run of the other endless chain, between which chains the spool-frames are supported in the usual way.

Above the sets of sprocket-wheels 26 are arranged sets of rolls or carriers 27, arranged in pairs, over which the upper run of the two endless chains carrying the spool-frames extend and are supported.

One feature of our improvements relates to the arrangement of the sets of sprocket-wheels 26, located above and back of the loom proper.

We place the sprocket-wheels 26 quite close together, so that the lower run of the two endless chains instead of extending in a hori-

zontal plane, as is customary, and requiring a great deal of room extends in a series of free loops which hang down between the sprocket-wheels, by reason of the slack in the chains, as shown in Fig. 1. In this way very much less room is required for the main portion of the chains and there is great economy of space.

Another feature of our improvements relates to a positive drive or motion communicated to each pair of sprocket-wheels 26, supporting the lower run of the main portion of the endless chains carrying the spool-frames. One of each pair of sprocket-wheels 26 has a gear 28, which in this instance is fast on the shaft 26' of the pair of sprocket-wheels 26 and in position to be in mesh with the worm 25 on the shaft 24. The revolution of the worm 25, through the revolution of the shaft 24, communicates a positive revolution to the gear 28 and the sprocket-wheels 26. The meshing of the worm 25 with the gear 28 holds the gear and also the pair of sprocket-wheels 26 and prevents any excess of slack in the chains or any greater length of free loop of the chains on one side of the sprocket-wheels by reason of its greater weight moving or rotating the sprocket-wheels. In this way any amount of slack or any length of free loops of the chains is maintained without any danger of the accidental turning of any one of the pairs of sprocket-wheels 26 by reason of overweight on one side thereof.

We prefer to rotate the sprocket-wheels 26 intermittently to move the main portion of the chain intermittently. If all the sprocket-wheels 26 are given an intermittent motion simultaneously, then the shaft 24 must be rotated intermittently. This requires considerable power, and we prefer to have each pair of sprocket-wheels have an independent intermittent motion or to start and stop a little ahead or a little behind the next pair, and so on. In this way much less power is required to rotate the sprocket-wheels and move the chains.

In case the worms 25 are used on the shaft 24 to mesh with and drive the gears 28 and the sprocket-wheels 26 then we prefer to make the worms as shown in Fig. 2. Each worm 25 has a part of each tooth inclined, as shown at *a*, Fig. 2, and a part straight, as shown at *b*, Fig. 2. When the inclined part *a* is in mesh with the teeth of the gear 28, then the gear will be revolved by the revolution of the worm 25; but when the straight part *b* is in mesh with the teeth of the gear 28 then the gear will not be revolved. By this construction of the worm 25 an intermittent motion is communicated to each pair of sprocket-wheels 26 from the continuous motion of the worms 25, fast on the shaft 24.

The position of the different worms 25 axially to the shaft 24 may be so adjusted by means of the set of screws 25' that each pair of sprocket-wheels 26 will start to rotate at a different time instead of all starting simul-

taneously. In this way a great saving of power is obtained, for instead of moving the whole length of the main portions of the chains at one time only a portion of the chains is moved.

In the plane below the shaft 24 are arranged two pairs of sprocket-wheels 29 and 29', corresponding to the sprocket-wheels 26. These sprocket-wheels 29 and 29' are connected to rotate in unison by the endless chain or flexible connector 30, passing around the sprocket-wheels 31, fast on the shafts 32 of the sprocket-wheels 29 and 29', as shown.

The endless chains hang in a free loop 41 back of the back pair of sprocket-wheels 29, and from the front side of said pair of sprocket-wheels the endless chains, forming what we term the "secondary" chain 40', pass down and around the pair of sprocket-wheels 20, (see Fig. 5,) and the rotation of the sprocket-wheels 20 draws the chains from the free loop 41, above referred to, and rotates the two pairs of sprocket-wheels 29 and 29' through the connector 30. From the sprocket-wheels 20 the chains pass up over the front pair of sprocket-wheels 29' and then hang down in a free loop 41' and from said loop pass over the pair of sprocket-wheels 26, arranged in front of the vertical shaft 2 and in front of the loom, but connected with and driven by the shaft 24, in the same manner as the other sprocket-wheels 26. From said pair of sprocket-wheels 26 the chains pass over the end carriers 27, as shown in Fig. 1.

In Fig. 3 is shown a modified construction of the worm-and-gear mechanism for driving the sprocket-wheels shown in Fig. 2. A bevel-pinion 33 on the shaft 24 is substituted for the worm 25, and the pinion 33 meshes with a bevel-gear 34 on the end of the sprocket-wheel shaft 26' to rotate the same. By mutilating the bevel-pinion 33 or leaving out some of the teeth, as shown in Fig. 4, an intermittent motion is communicated to the bevel-gear 34 and sprocket-wheel 26 from a continuous motion of the bevel-pinion 33 and shaft 24. The bevel-pinion 33 may be adjusted axially on the shaft 24 by means of a set-screw 33' in the hub 33'', the same as the worms 25 and for the same purpose, as above described.

In Fig. 1 the driving bevel-gear 9 has a continuous motion, thus communicating a continuous motion to the vertical shaft 2 and, through gears 10 and 11, to shaft 12 of the secondary driving means for the secondary portion 40' of the chains and, through gears 22 and 23, to the shaft 24 of the main driving means for the main portion 40 of the chains.

Instead of a continuous motion being communicated to the shaft 2, as above described, an intermittent motion may be communicated by means of a mutilated driving-gear 35, meshing with a gear 36, fast on the shaft of the bevel-gear 9, which is also mutilated.

To turn the chains backward or forward by

hand, if desired, when the collar 5 is moved to its intermediate position, as above described, we may secure on the end of the shaft 16 (see Fig. 5) a disk 37, with projecting pins 37', to be engaged by a bar in the hands of the attendant. The turning of the disk 37 in one direction or in the other will move forward or reverse the secondary portion of the chains carrying the spool-frames.

- 10 The advantages of our improvements will be readily appreciated by those skilled in the art. The slack in the lower runs of the main portion of the endless chains will hang down in the form of free loops between the pairs of sprocket-wheels in any desired length, and as the pairs of sprocket-wheels rotate, either together or separately, to move forward the main portion of the chains and carry it into the secondary portion, from which the spool-frames are removed and replaced, each pair of sprocket-wheels takes the chains from one of the free loops and supplies the chains to another of said loops, so that the relative length of the free loops will always be maintained. The driving of each pair of sprocket-wheels positively and independently to move the main portion of the chains into the secondary portion gives a very steady movement to the chains and requires much less power.
- 15 In the case of the two lower pairs of sprocket-wheels 29 and 29', supporting the secondary portion of the chains, the slack in the chains, which hang down in a free loop back of the back pair of sprocket-wheels 29 and front of the front pair of sprocket-wheels 29', allows the pair of sprocket-wheels 20 which move forward or backward of the secondary portion 40' of the chains to have a motion entirely independent, as to time, of the motion of the sprocket-wheels 26.

It will be understood that the details of construction of our improvements may be varied, if desired.

- Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains, with free loops of chain that may vary in length between said sprocket-wheels, of means for communicating a positive motion to each pair of sprocket-wheels to move the loop of chain between the same independent of the other portion of the chain, substantially as shown and described.

2. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains, and relatively arranged so that the chains will hang down in free loops on one or both sides of each pair of sprocket-wheels, of means for communicating a positive motion

to each pair of sprocket-wheels to move the loop of chain between the same independent of the other portions of the chains, substantially as shown and described.

3. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains, and relatively arranged so that the chains will hang down in free loops on one or both sides of each pair of sprocket-wheels in varying lengths of means for communicating a positive intermittent motion to each pair of sprocket-wheels to move the loop of chain between the same, independent of the other portions of the chains, substantially as shown and described.

4. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels, supporting the lower runs of the endless chains, and relatively arranged so that the chains will hang down in free loops on one or both sides of each pair of sprocket-wheels, of means for communicating a positive motion at different times to each pair of sprocket-wheels to move the loops of chain between the same at relatively different times, independent of the other portions of the chains, substantially as shown and described.

5. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two pairs of sprocket-wheels supporting the secondary portion of the endless chains, from which the spool-frames are removed and replaced, of the endless chains supported on and hanging down freely and in varying lengths on each side of said sprocket-wheels, and means for independently moving the main and secondary portions of the chains at desired times, substantially as shown and described.

6. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two pairs of sprocket-wheels supporting the secondary portion of the endless chains with free hanging loops of chain that may vary in length on each side of said sprocket-wheels, of a third pair of sprocket-wheels under which said endless chains pass, and means to intermittently move said third pair of sprocket-wheels, said means operated through a shaft-and-gear connection with the upright driving-shaft for the main portion of the endless chains, substantially as shown and described.

7. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two pairs of sprocket-wheels supporting the secondary portion of the endless chains from which the spool-frames are removed and replaced, of a third pair of

sprocket-wheels under which said endless chains pass, and means to intermittently move said third pair of sprocket-wheels, said means operated through a shaft-and-gear connection with the upright driving-shaft for the main portion of two endless chains, and means for disconnecting the upright driving-shaft and turning said third pair of sprocket-wheels backward or forward, as desired, substantially as shown and described.

8. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains with free loops of chain between the pairs of said sprocket-wheels and of varying lengths, of means for communicating a positive motion to each pair of sprocket-wheels to move the same independent of any drag of the chains, said means comprising a driven shaft, worms or gears adjustable on said shaft relative to their axes, and each worm or gear meshing with and driving a gear fast on the shaft of, or connected with one of each pair of sprocket-wheels supporting the lower runs of the endless chains, substantially as shown and described.

9. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains with free loops of chain of varying lengths between the pairs of sprocket-wheels, of means for communicating a positive motion to each pair of sprocket-wheels to move the chain-loops adjacent thereto independent of any other portions of the chains, said means comprising a driven shaft, a series of worms thereon, each worm having a part of each tooth inclined and a part straight to commu-

nicate an intermittent motion to a gear fast on the shaft of, or connected with one of each pair of sprocket-wheels supporting the lower runs of the endless chains, substantially as shown and described.

10. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with two or more pairs of sprocket-wheels supporting the lower runs of the endless chains in loops of varying lengths between the pairs of sprocket-wheels, of means for communicating a positive motion to each pair of sprocket-wheels to move the loop of chain adjacent thereto independent of other portions of the chains, said means comprising a driven shaft, worms adjustable axially thereon, and secured thereto, each worm having a part of each tooth inclined and a part straight to communicate an intermittent motion to a gear fast on the shaft of, or connected with one of each pair of sprocket-wheels supporting the lower runs of the endless chains, substantially as shown and described.

11. In a loom for weaving moquette carpets, or other tufted fabrics, in which endless chains carrying spool-frames are used, the combination with a plurality of pairs of sprocket-wheels supporting the lower runs of the endless chains with free loops of said chain between each pair of sprocket-wheels, of means for communicating a positive motion at different times to each pair of sprocket-wheels to move the chain-loops independently.

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