Oct. 3, 1950 J. H. PFAU 2,524,734

AXMINSTER NEEDLE DRIVE MECHANISM

Filed May 14, 1949

Fig. 1.

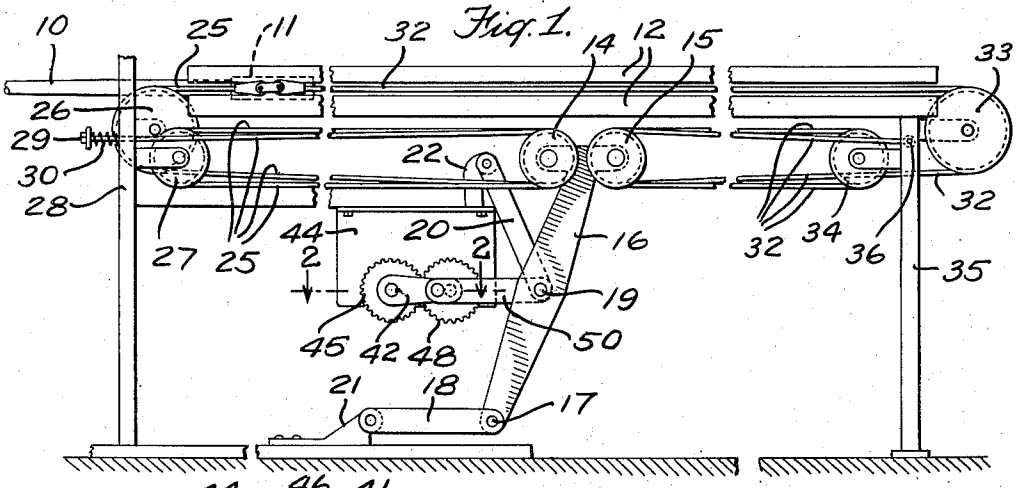


Fig. 2.

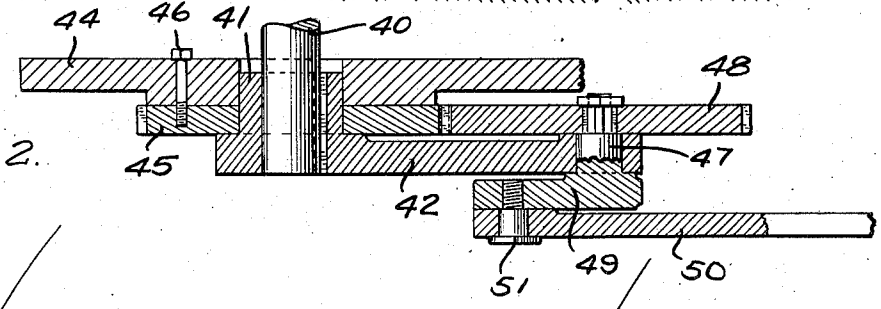
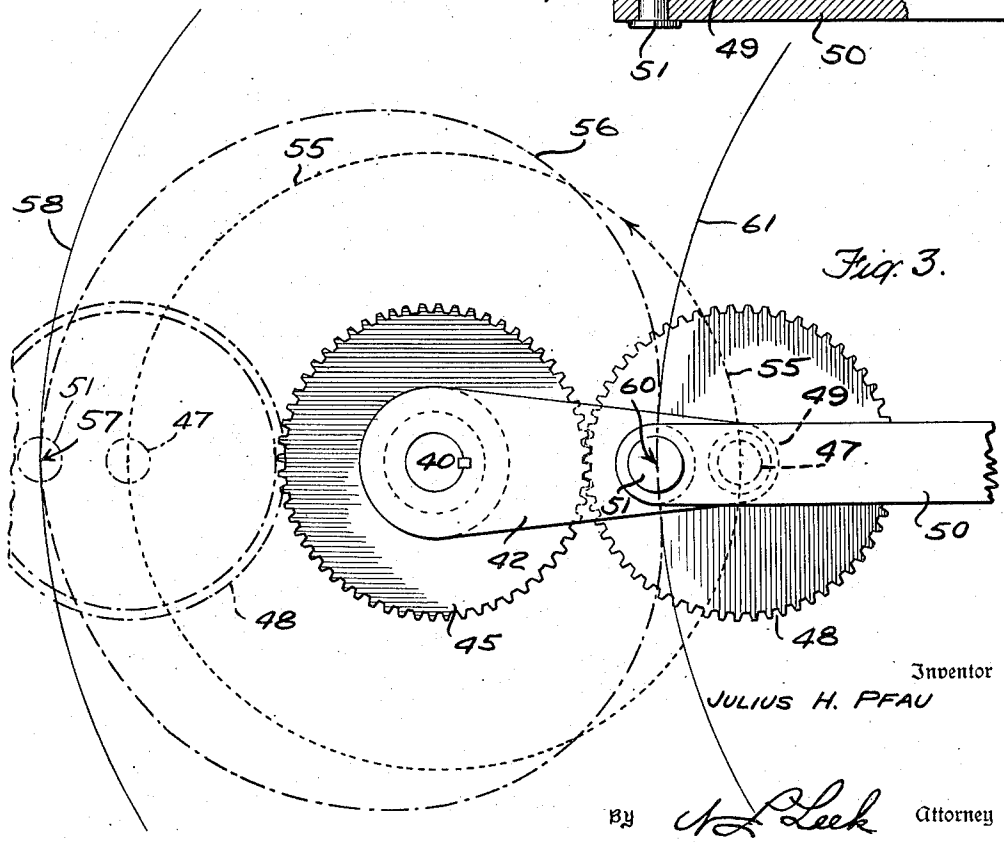


Fig. 3.



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AXMINSTER NEEDLE DRIVE MECHANISM

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1 Claim. (Cl. 139—123)

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This invention relates to a drive mechanism for Axminster looms and has for an object to improve the control of the needle at the end of its thrust.

Another object is to reduce the effect of the overrunning of the needle at the end of its thrust, particularly at high speed.

Another object is to provide a needle drive mechanism of the above type in which the needle position with respect to the shuttle contact remains constant regardless of changes in operating speed.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Axminster looms customarily include a needle which is advanced entirely across the loom through the warp shed and cooperates at the end of its thrust with a shuttle which is adapted to interloop a selvage thread with the double pick of weft inserted by the needle. Since the needle must be at least as long as the width of the warp shed and its stroke is of a corresponding length, the needle-actuating mechanism possesses considerable inertia, particularly in wide looms. Due to this inertia and the inherent flexibility of the actuating mechanism, it has been found that the final position of the needle at the end of its thrust may vary by a substantial amount when the loom is operating at high speed from its position at low speed, this variation at times being such as to interfere with the proper functioning of the shuttle.

The present invention overcomes this difficulty by providing a special type of drive having a reciprocating motion which provides for a dwell when the needle reaches the end of its stroke. The dwell is sufficient to permit the drive mechanism to return to equilibrium before the time of shuttle contact. The needle position at the time of contact thus becomes independent of loom speed.

The details of the mechanism and the manner of its operation will be better understood by referring to the following description, taken in connection with the accompanying drawing in which a specific embodiment has been shown for purposes of illustration.

In the drawing:

Fig. 1 is a somewhat diagrammatic side elevation of a drive mechanism embodying the invention;

Fig. 2 is an enlarged section taken on the line 2—2 of Fig. 1 showing the construction of the planetary drive; and

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Fig. 3 is an enlarged diagram illustrating the motion obtained by the drive mechanism.

Referring to the drawing more in detail, the invention is shown as embodied in an Axminster loom having a needle 10 mounted in a carriage 11 which slides in a track on rails 12. It is to be understood that the length of the needle 10 and of the rails 12 is such that the needle is capable of reciprocating in a path extending through the warp shed of the loom.

The needle may be repicrocated by any suitable motion multiplying mechanism. In the form shown this comprises two sets of movable sheaves 14 and 15 mounted on the upper end of an arm 16 which is pivoted at its lower end by a pin 17 to a link 18 and at an intermediate point by a pin 19 to a link 20. The links 18 and 20 are pivoted to fixed brackets 21 and 22. The link 20 is the same length as the portion of the arm 16 above the pin 19, and thus causes the upper end of the arm 16 and the sheaves 14 and 15 to reciprocate in a straight line.

A cable 25 is connected at one end to the carriage 11 and extends around a fixed pulley 26, thence back and forth several times between movable sheaves 14 and a set of stationary sheaves 27 and its other end is anchored to a frame 28 by means of a rod 29 and is held under tension by a spring 30.

A cable 32 is connected at one end to the carriage 11 and extends around a fixed pulley 33, thence back and forth several times between movable sheaves 15 and a set of fixed sheaves 34 and its end is anchored to the frame 35 at 36. The arrangement is such that reciprocation of the upper end of the arm 16 causes the cables 25 and 32 to reciprocate the carriage 11 in its track along the rails 12, the sets of sheaves serving to multiply the motion by the required amount. The sheaves 14 and 15 have been shown as offset for clearness. In practice they would be mounted co-axially on the arm 16.

The mechanism thus far described is of standard type and only so much thereof has been shown as is necessary to an understanding of the invention. A drive of this type is shown more in detail in Patent No. 2,258,193 for Axminster Needle Motion and Thread Drive Therefor dated October 7, 1941, to O. V. Payne.

For driving the arm 16 there is provided a drive shaft 40 which is driven by a suitable source of power and is keyed to a hub 41 formed at one end of an arm 42. The hub 41 is journalled in aligned bores in a fixed plate 44 and in a stationary or sun gear 45 which is secured to the

plate 44 by bolts 46. A shaft 47, journalled in the free end of the arm 42, carries at one end a planet gear 48 of the same size as and meshing with the sun gear 45, and at its other end a crank arm 49. A link 50 is pivoted at one end by a pin 51 to the crank arm 49 and at its other end is pivoted to the pin 19.

The crank arm 49 is so positioned with respect to the planet gear 48 that the arm 49 extends toward the center of the sun gear 45 and away from the arm 16 when the arm 16 is at the limit of its stroke with the needle 10 at the end of its thrust in the warp shed.

The operation of this mechanism will be understood from Fig. 3 in which the sun gear 45 and planet gear 48 are represented by correspondingly numbered circles. The dotted circle 55 represents the path of the center of the planet gear 48 as it revolves around the sun gear 45, and the dot and dash line 56 represents the path of the pin 51 on the crank arm 49. It will be noted that at the point 57 the arc of the path 56 has a somewhat greater curvature than the circle 55. The arc 58 is taken about the pin 19 as a center when the pin 19 is in its extreme left-hand position with the pin 51 at position 57. The divergence between the arc 58 and the curve 56 represents the rate of deceleration and acceleration of the pin 19 at the end of its stroke at which the needle 10 is fully retracted from the warp shed. Since the center of the arc 58 and the curve 56 are both on the same side of the point 57, this divergence is not great. Hence the arm 16 is reversed in direction of travel with a smooth motion.

The pin 51 is at the point 60 on the curve 56 at the instant of needle reversal when the needle is fully advanced. It will be noted that at this point the curve 56 is slightly reentrant. The arc 61 is taken about the pin 19 as a center when the pin 19 is at the right-hand limit of the stroke. Here again the divergence between the arc 61 and the curve 56 represents the rate of deceleration and acceleration of the pin 19 (and of the arm 16) at the righthand limit of its stroke. Since the curve 56 is slightly reentrant at the point 60, the curve 56 and the arc 61 substantially coincide for a short distance and the extent of this coincidence may be controlled by a suitable selection of the dimensions of the parts. During this coincidence there is no movement of the pin 19. Hence the arm 16 is gradually brought to rest and has a period of dwell before reversal. If desired the dimensions may be selected to even cause the pin 19 to undergo a slight retraction at the ends of its stroke.

The period of dwell allows the flexing of the drive mechanism and cable stretch to be equalized and the needle to return to a given position where it remains stationary during the shuttle contact, and the shuttle is so timed that contact is delayed until the overrun has been corrected and the needle has returned to its correct position. The needle position at time of contact is thus made practically independent of loom speed and the loom may be operated at higher than normal speeds without difficulty.

It is to be understood that the invention is not restricted to the particular type of drive shown, but may be used with other types of motion multiplying mechanism and is useful in general for reducing the rate of change and reversal of reciprocating members. Various adaptations will be apparent to a person skilled in the art.

What is claimed is:

In an Axminster loom having a needle adapted to be reciprocated to lay double weft shots through a warp shed, drive mechanism connected to reciprocate said needle, said mechanism comprising a pivoted arm, motion multiplying means connecting said arm to actuate said needle, a continuously rotating drive member, and connecting members connecting said drive member to cause reciprocating movement of said arm, said connecting members comprising a stationary sun gear, a planet gear of the same size as said sun gear driven by said driving member to revolve around said sun gear, and a link connected eccentrically to said planet gear and also connected to drive said arm, said eccentric connection being so disposed that the link is offset from the center of said planet gear toward the center of said sun gear when the planet gear is on the side of said sun gear toward said arm and the arm is at one limit of its stroke, said arm being so connected to said needle that the needle is then at the limit of its inward thrust in the warp shed.

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REFERENCES CITED

The following references are of record in the file of this patent:

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