No. 810,471. PATENTED JAN. 23, 1906.

H. W. DAVIS.

LOOM.

APPLICATION FILED DEC. 23, 1904.

Fig. 1.

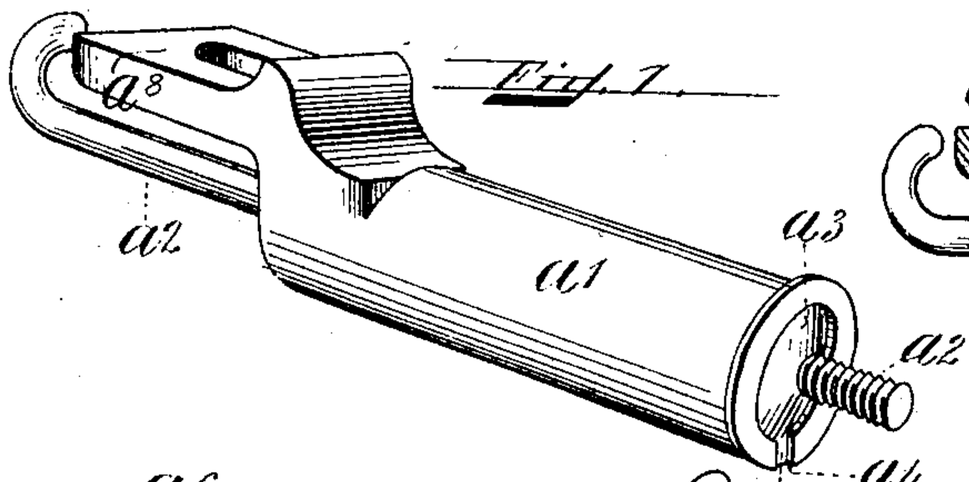


Fig. 2.

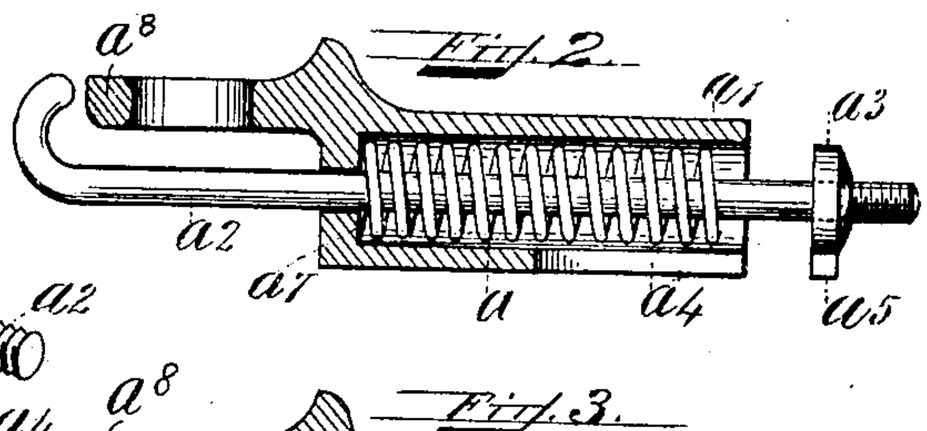


Fig. 3.

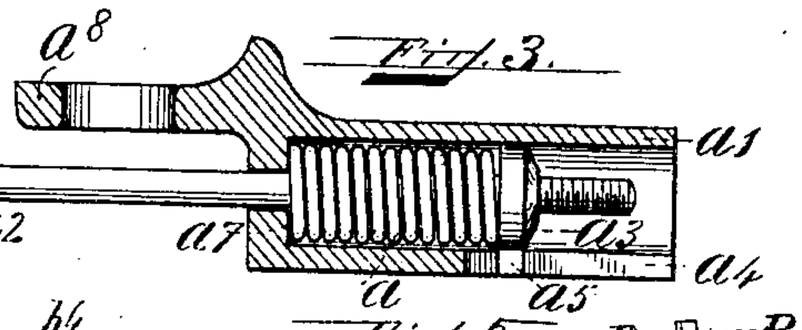


Fig. 4.

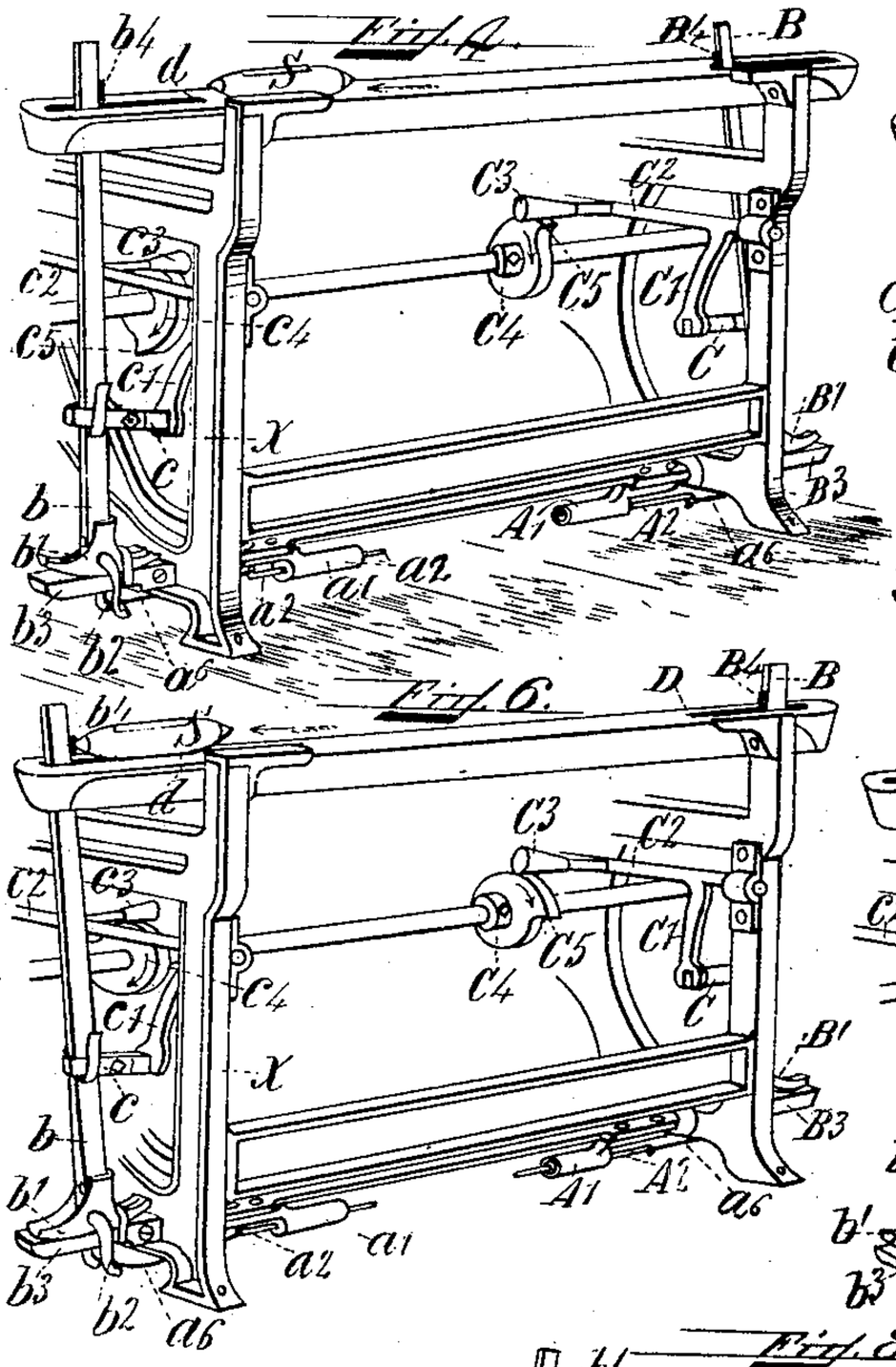


Fig. 5.

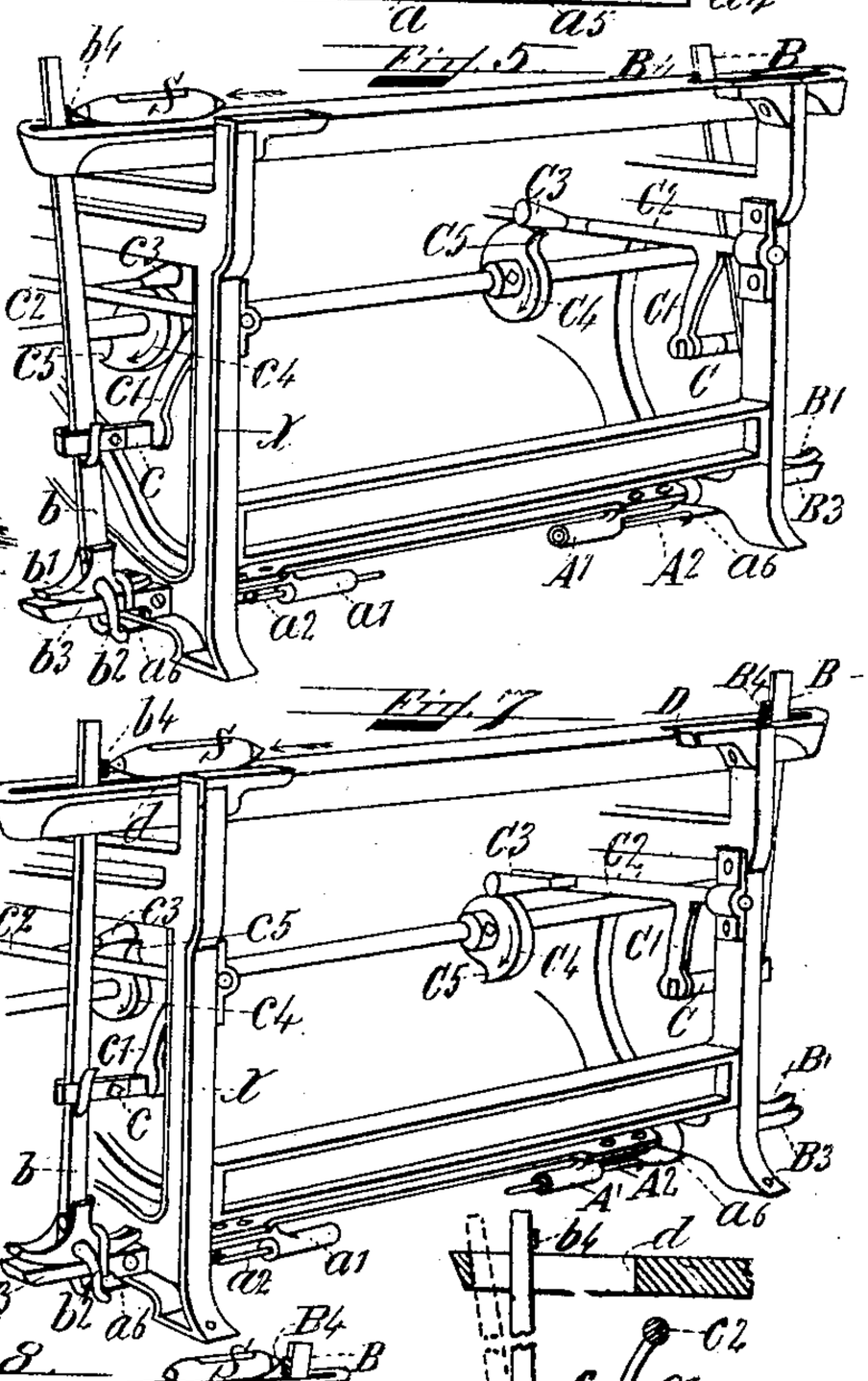


Fig. 6.

Fig. 7.

Fig. 8.

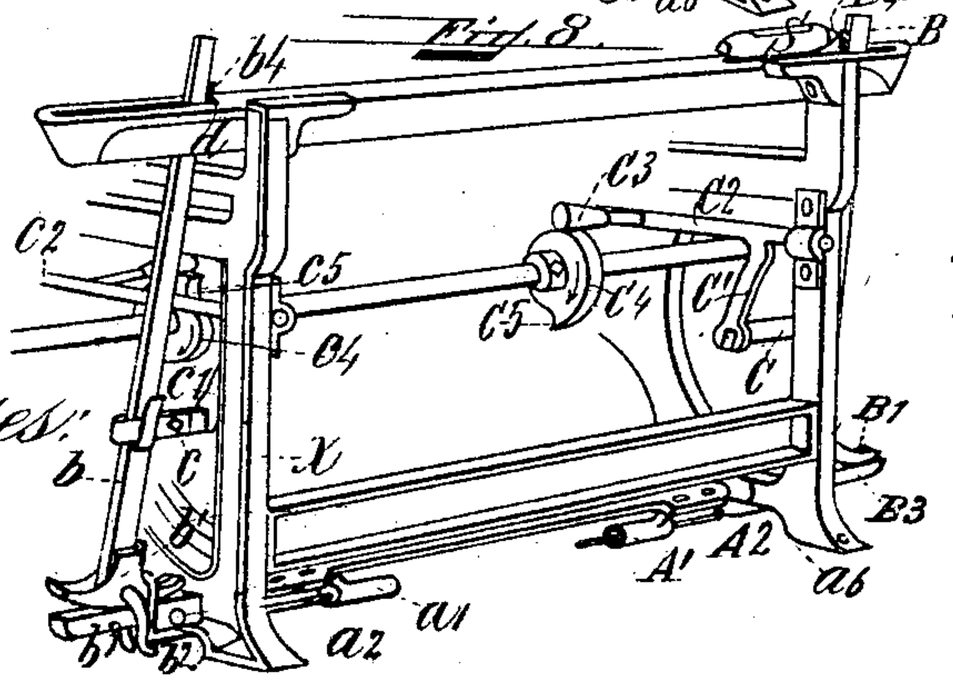
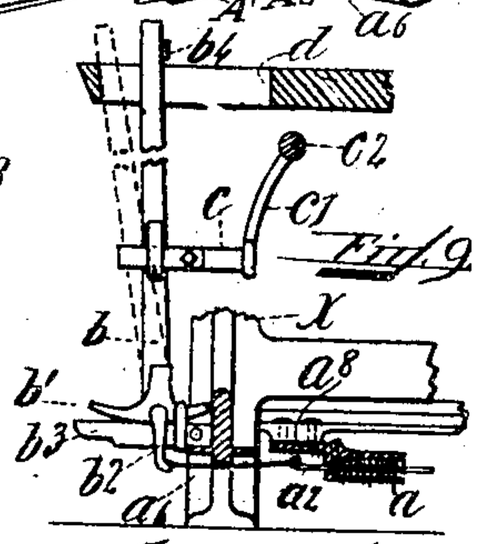


Fig. 9.



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UNITED STATES PATENT OFFICE.

HERBERT WOODBURY DAVIS, OF FALL RIVER, MASSACHUSETTS.

LOOM.

No. 810,471. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed December 23, 1904. Serial No. 238,055.

To all whom it may concern:

Be it known that I, HERBERT WOODBURY DAVIS, a citizen of the United States, residing at Fall River, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Looms, of which the following is a specification.

The general object of my invention is to provide means whereby a loom may be operated with less power, less breakage and wearing of the parts, and with greater speed and uniformity than heretofore.

Formerly a spiral spring has operatively connected the heels of opposite picker-sticks and has been under sufficient tension to hold the picker-sticks in their extreme outer positions in their respective shuttle-boxes. Consequently much of the power required to move each picker-stick, and thus throw the shuttle, has been dissipated in overcoming throughout each pick the constantly-increasing tension of the spring and the added friction between the parts constituting the mechanism for driving the picker-stick, especially the friction between the picker-ball and the point of the picking-cam. During the operation of this old form of construction each picker-stick and its picker are substantially stationary when the inracing shuttle impinges against them in their outer position. The picker-stick is thus frequently broken and its picker soon worn out. A still further objection to this old construction resides in the impossibility of making the picker-sticks and their coöperating mechanism exactly alike, which impossibility prevents the action of one stick from being exactly the same as that of the other. Their desired uniformity of action is thus not attained.

Now the particular object of my invention is to provide means to overcome these objections, and I accomplish it by so designing said means that each picker-stick is operated entirely independently of the other; that when the picker-stick is at a state of rest, which we will call its "normal" position, it is free—that is, unopposed, as by a spring—to be moved by the inracing shuttle to its extreme outward position and also to be moved back to its normal position by the driving mechanism operating the picker-stick to throw the shuttle to the opposite box; but when the driving mechanism moves the picker-stick inwardly beyond its normal position then the movement of the picker-stick begins to be and is retarded by an opposing force until the picker-stick stops and is returned to its normal position. In short, the prior state of the art shows that the picker-sticks were always under a spring tension, tending to hold them in their extreme outward positions and to oppose any movements imparted to them by their driving mechanisms, while in apparatus embodying my invention each picker-stick is operated independently of the other, tends to occupy a normal position between the limits of the extreme inward and outward positions, and is subjected to the action of a force acting in a direction opposite that of the driving mechanism only during the movements of the picker-stick between said normal position and its extreme inward position.

In the drawings illustrating the principle of my invention and the best mode now known to me of applying said principle, Figure 1 shows a novel element of my invention. Fig. 2 is a longitudinal section thereof and shows the method of assembling its spring, draw-bar, and lock-nut. Fig. 3 is a like view, but shows the spring, shell, and nut resisting an outward movement of the draw-bar. Figs. 4, 5, 6, 7, and 8 show the various positions of the coöperating parts during the operation of my invention and so much of the loom as will illustrate my invention, the shuttle-boxes and check-straps and the means for supporting and operating the lay being omitted for the sake of clearness, as they constitute merely the environment of my invention. Fig. 9 is a detail, in section, in front elevation, and shows the picker-stick and its extreme range of free movement.

A rocker-spring a (see Fig. 2) is confined in a shell a' and has extending axially through it a draw-bar a^2, one end portion of which extends through the bottom or closed portion of the shell and is bent up into a hook, while the other is threaded and has a threaded nut a^3 mounted thereon and of such diameter that the nut may freely move axially of the shell a' with the draw-bar a^2. The shell may have a slot a^4 parallel with its longitudinal axis, and the nut a depending lug a^5 movably to engage said slot. The parts being assembled as in Fig. 1, the draw-bar a^2 (see Fig. 3) is moved, as by a heel-strap a^6, in the direction indicated by the arrow, the

spring a resisting the movement of the draw-bar a^2 by compression between the closed portion a^7 of the shell and the nut a^3 on the free end portion of the draw-bar a^6. By turning the nut a^3 forward and back when it is free from the shell, as in Fig. 2, tension upon the draw-bar a^2 may be regulated and the nut a^3 locked to the draw-bar a^2 by the engagement of lug a^5 and slot a^4, as in Fig. 3. Projecting from the shell a' is a slotted member a^8, which enables the shell a' to be bolted to a loom.

The construction of the above spring and its coöperating parts being understood, they will next be considered in connection with the picking mechanism of a loom.

Each picker-stick b is provided with its usual rocker b', heel b^2, and rocker-bed b^3, all designed to permit the picker-stick to conform to the movements of the lay. It also has its picker b^4 and is operated, as usual, by the lug-strap c, arm c', picking-shaft c^2, picking-ball c^3, and picking-cam c^4, having a cam-point c^5, the picking-cams being set one hundred and eighty degrees apart on this shaft. Mounted on the frame x and in the plane of the vibrating picker-stick are the shell a', draw-bar a^2, and spring a. The strap a^6 operatively connects the heel b^2 of the picker-stick b with the hooked draw-bar a^2.

In Fig. 4 the picker-stick b is shown in its normal position, the strap a^6 and the draw-bar a^2 being taut and the spring a ready to resist by compression any movement of the picker-stick b toward the opposite picker-stick B, while looseness of the lug-strap c and the unopposing spring a permits a movement of the picker-stick b away from the opposite picker-stick B. A reference to Fig. 9 shows the picker-stick b in its two extreme positions, between which it may move unopposed by this spring a and the mechanism driving the picker-stick b.

I will now describe the operation of my invention, reference being had first to Fig. 4 of the drawings. A shuttle S is represented as having just left the picker-stick B and is about to impinge against the picker b^4 on picker-stick b. It will be noted that the picker-stick B is in its innermost position and that its spring A is under its greatest compression, the picker-ball C^3 having just passed the point C^5 of the picking-cam C^4, the picker-stick having been moved from its outermost position—say half-way toward its innermost position—by the engagement of the picker-ball C^3 with the picking-cam C^4 and the cam-point C^5 and for the remainder of its movement to its innermost position by its own momentum. In Fig. 5 the shuttle S has advanced and come into contact with the picker b^4. As the picker-stick b is in its normal position when the shuttle first impinges the picker-stick, the inertia of the picker-stick opposes the momentum of the incoming shuttle S. This momentum is reduced, but enough is left to force the picker-stick b to its extreme outer position. (Shown in Fig. 6) As stated above, a common check-strap is assumed to be in the drawings, and it finally limits and stops the outward movement of the picker-stick b and the incoming shuttle S. The strap-and-rod connection between the heel b^2 and the spring a is now loose and the picking-cam c^4 about to cause the picker-stick b to throw the shuttle S to the opposite box, where picker-stick B is in its normal position to receive the shuttle S at the next pick. Fig. 7 shows the position of the moving picker-stick b after the completed action of the picker-ball C^3 and picking-cam C^4 and while the momentum of the picker-stick is beginning to be opposed in the latter part of the picker-stick movement by the compression of the spring a. Notice is to be taken that up to this moment (see also Fig. 9) the spring a has in no way interfered with the mechanism driving the picker-stick b from its extreme outward position to its normal position and that only after it has moved inward beyond the normal position does the spring begin opposition to it by beginning to become compressed, said opposition being practically nothing at first. In the next view, Fig. 8, the picker-stick b is in its extreme inward position and the compression of the spring a is greatest, and therefore prevents the picker-stick b from striking the bumper d with the force it otherwise would. The shuttle S is just impinging the picker B^4 of the opposite picker-stick B in its normal position, and its spring A is out of action. The picker-stick b having stopped, its spring a with decreasing force moves it back to its normal position, (shown in Fig. 4,) and the cycle of operation is completed.

It will now be plain that in the preferred form of construction the force opposing the movement of the picker-stick is brought into action only after the action of the driving mechanism has ceased, and consequently said force does not contribute to the friction between the parts of the driving mechanism; but obviously if the opposing force is applied earlier—during but only after the beginning of the action of the driving mechanism—the friction between the parts of the driving mechanism will be less than it would be if the force were acting simultaneously with but in opposition to that of the driving mechanism. In fine, by means of my invention the force opposing the operation of the picker-stick during each pick begins its action not at the beginning of that of the driving mechanism, but after it. There is less friction between the parts of the driving mechanism, less driving power is required, and the wear and tear is reduced. Further, the movement of the

picker-stick terminates with less abruptness, the picker-stick is less likely to break, and its picker by reason of the picker-stick being loose in its normal position when the shuttle impinges against the picker does not become so quickly worn as formerly, and therefore is longer lived, and the action of one picker-stick may be made to be exactly like that of the other. The spring and coöperating parts also have these advantages, that they are compact, inclosed in a shell, and neat in appearance. The old spiral spring is unsightly, it rests upon floor, is uncovered, it soon becomes clogged with dust and dirt, and can be cleaned only with great difficulty and patience.

While I have described the mechanism in which my invention may be embodied with great particularity, clearly it may be embodied in many different forms without departing from the spirit and principle thereof, and any mechanism which so operates upon a picker-stick that the latter moves and acts in the way described to accomplish the result sought employs the principle of my invention.

Desiring to protect the principle of my invention in the broadest manner legally possible, what I claim is—

1. In a loom, a picker-stick having movement to throw a shuttle across the loom and mechanism for operating the picker-stick to throw the shuttle; means whereby such picker-stick is maintained normally in position intermediate its inward and outward limits of movement, such picker-stick being unopposed and being free to move for a distance in either direction from such normal position; and means acting after the beginning of the inward movement of such picker-stick to restrain the same, such means tending to return the picker-stick to its normal inactive position.

2. In a loom, a picker-stick; driving mechanism operating the picker-stick to throw a shuttle; and means whereby a force opposing that of the driving mechanism is offered to the picker-stick after the driving mechanism has begun to operate the picker-stick; restrains the inward movement of the picker-stick; and causes the picker-stick to move part way to its outward position, where it receives the impact of an inracing shuttle to move the picker-stick to its outward position.

3. In a loom, a picker-stick; driving mechanism operating the picker-stick to throw a shuttle; and means whereby a force, increasing in strength, opposes the movement of the picker-stick after the driving mechanism has ceased to act upon the picker-stick, and, with decreasing strength causes the picker-stick to return to a position between the extreme limits of its travel, to receive the impact of an inracing shuttle, the picker-stick being free to be moved by the shuttle into its extreme outward position, to be acted on by the driving mechanism.

4. In a loom, a picker-stick; driving mechanism operating the picker-stick to throw a shuttle; and means whereby a force, with increasing strength, opposes the movement of the picker-stick after the driving mechanism has ceased to act upon the picker-stick, and causes, with decreasing strength, the picker-stick to return to a position between the limits of its travel; said driving mechanism and said restraining means being so adjusted in relation to the picker-stick that neither of them opposes the operation of the other, and yet each permits the picker-stick to occupy freely a position between the extreme limits of its travel, and, upon receiving the impact of the inracing shuttle, to be moved to its extreme outward position, to be acted upon by the driving mechanism.

5. In a loom, a picker-stick; driving mechanism operating the picker-stick to throw a shuttle; and a spring operatively connected with the picker-stick, and opposing the movement of the picker-stick after the driving mechanism has ceased to act upon the picker-stick, and causing the picker-stick to return to a position between the extreme limits of its travel, to receive the impact of an inracing shuttle, which in turn, moves the picker-stick freely to its extreme outer position, to be acted upon by the driving mechanism.

6. In a loom, a picker-stick; driving mechanism operating the picker-stick to throw a shuttle; and a spring operatively connected with the picker-stick and opposing, by compression, the movement of the picker-stick, after the driving mechanism has ceased to act upon the picker-stick, and causing, by expansion, the picker-stick to return to a position between the extreme limits of its travel, to receive the impact of an inracing shuttle, the picker-stick being free to be moved by the shuttle into its extreme outward position, to be acted upon by the driving mechanism.

7. In a loom, a picker-stick; driving mechanism operating said picker-stick, during a portion of the pick; a spring, a draw-bar, an adjusting-nut threaded therein, all combined with a shell or guide fixed to the loom, and operatively connected to the picker-stick, to oppose, by compression of the spring, the movement of the picker-stick after the driving mechanism has ceased to act upon the picker-stick, and to cause by expansion, the picker-stick to return to a position between the extreme limits of its travel to receive the impact of an inracing shuttle, the picker-stick being free to be moved by the shuttle

into its extreme outward position, to be acted upon by the driving mechanism.

8. As an article of manufacture, a shell, or guide; a spring mounted therein; a draw-bar, axially arranged within the spring; a slot in said shell, parallel with the axis of the draw-bar; a threaded adjusting-nut engaging said draw-bar, and having a depending lug to engage said slot, whereby the nut may be locked to the bar.

In testimony whereof I affix my signature in presence of two witnesses.

HERBERT WOODBURY DAVIS.

Witnesses:

I. M. FRANCIS,

EUGENE COLE, Jr.