May 2, 1950 W. C. FRENCH 2,506,145

PICKER STICK GOVERNOR MECHANISM

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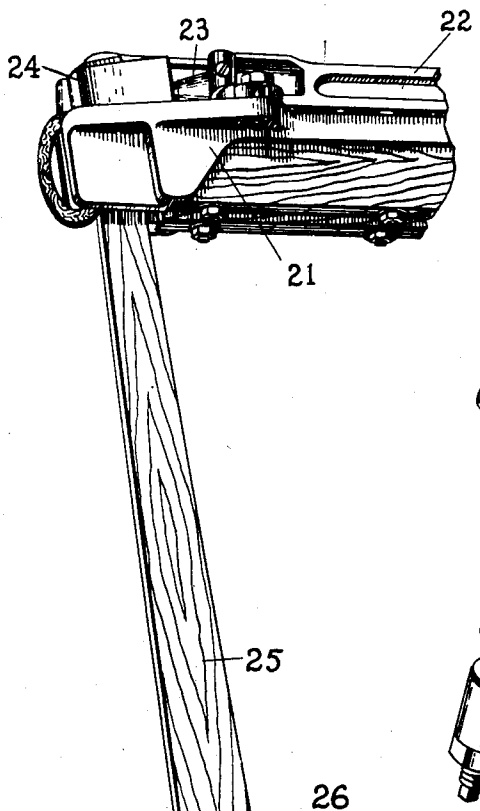


Fig. 1

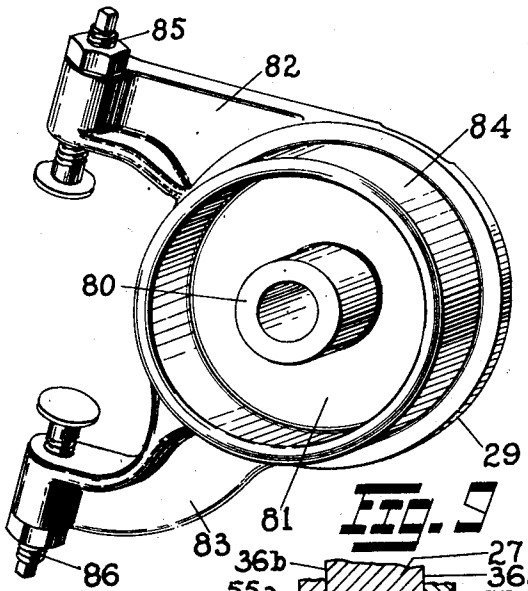


Fig. 9

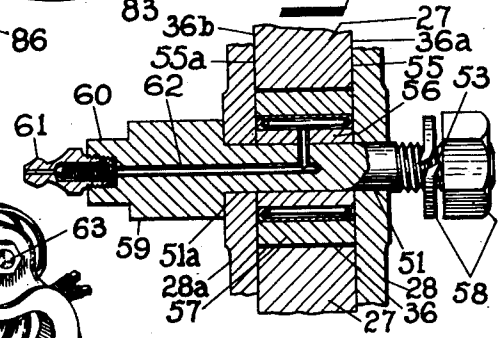
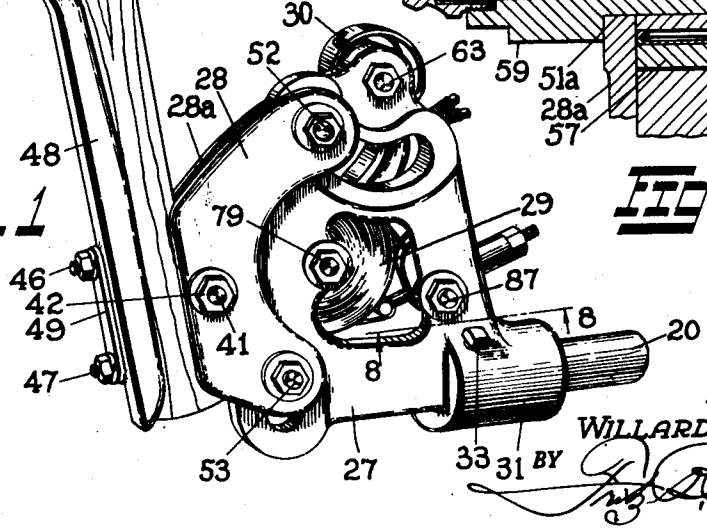


Fig. 13



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PICKER STICK GOVERNOR MECHANISM

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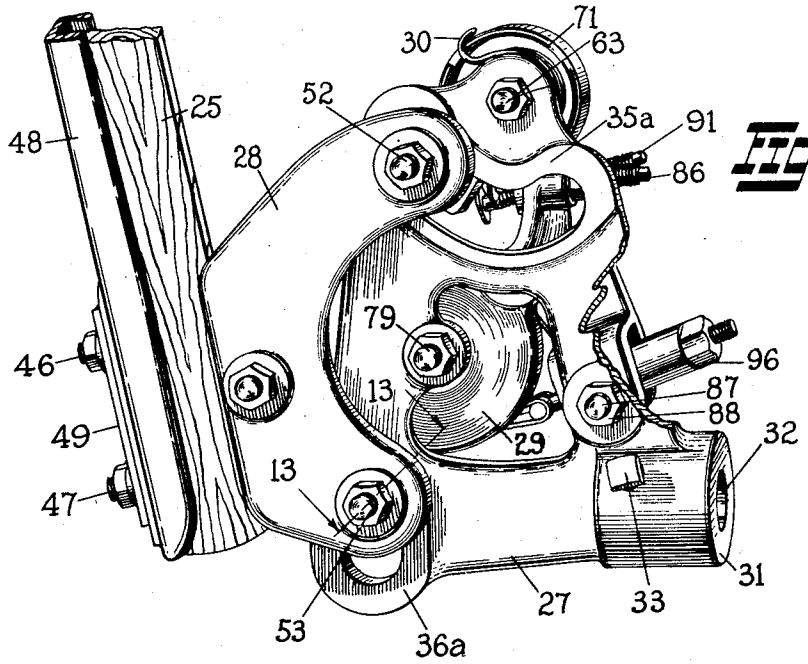


Fig. 2

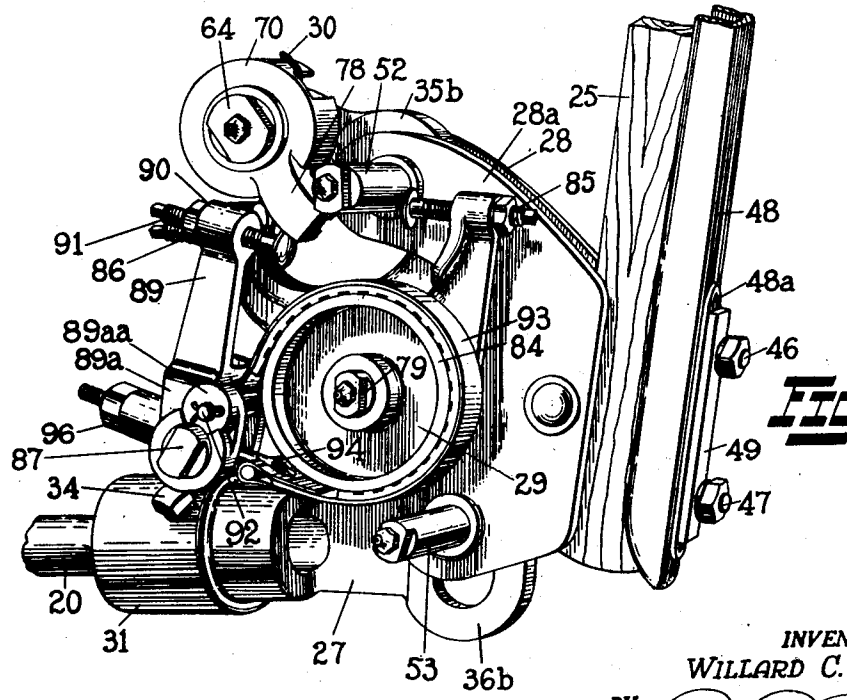


Fig. 3

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PICKER STICK GOVERNOR MECHANISM

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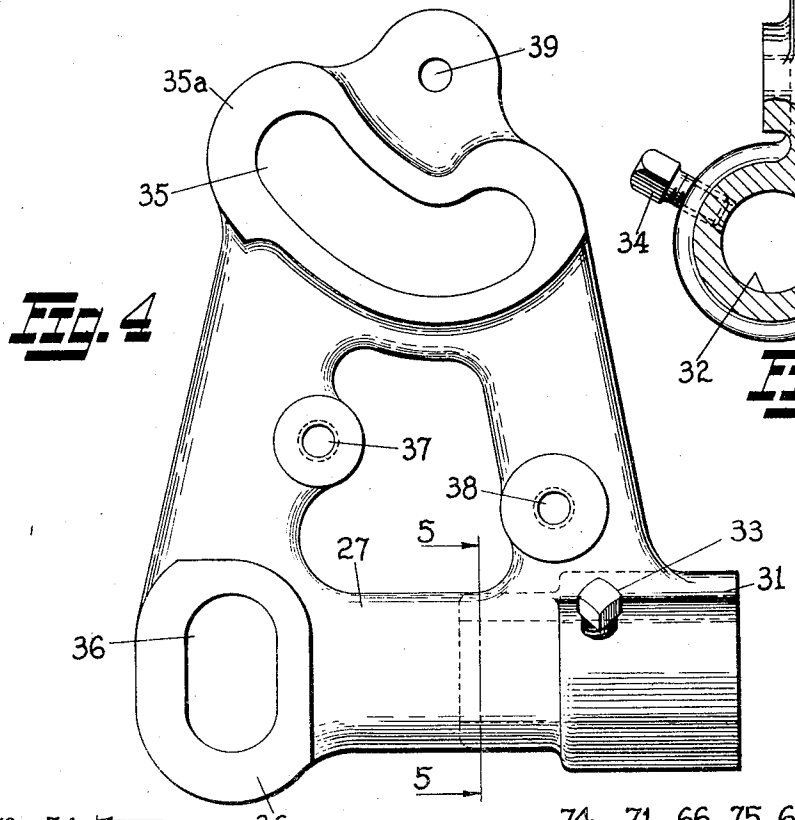


Fig. 4

Fig. 5

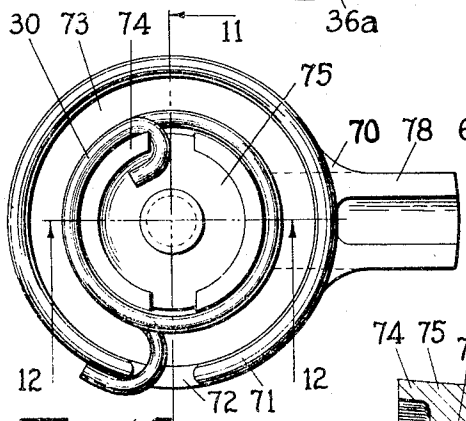


Fig. 10

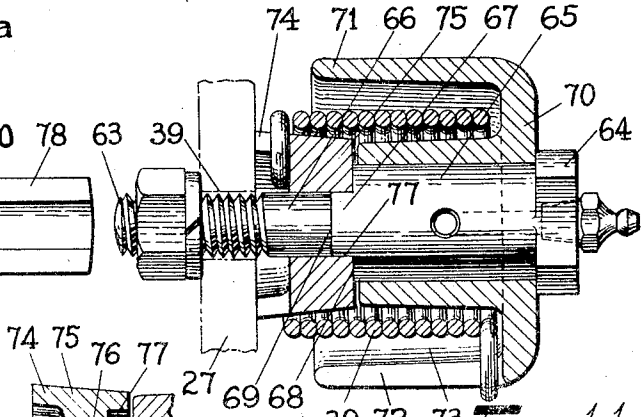


Fig. 11

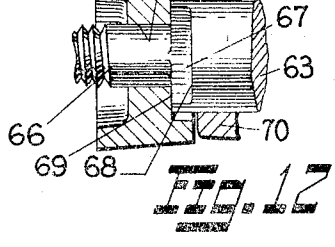


Fig. 12

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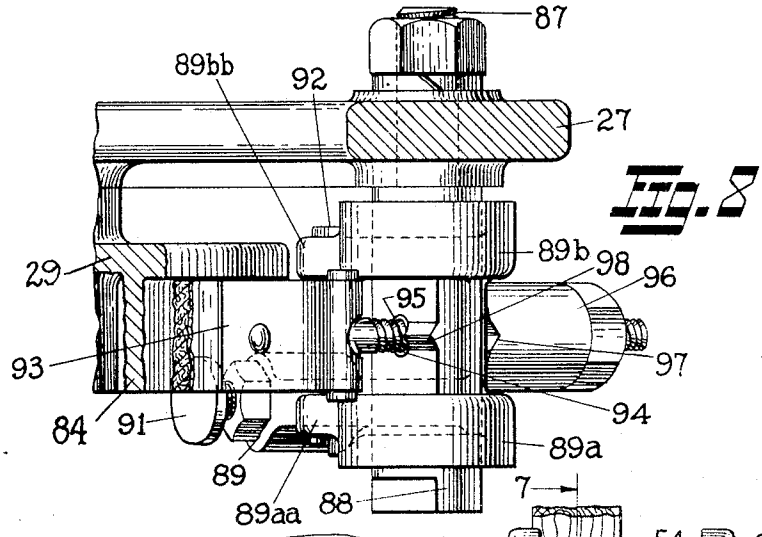


Fig. 8

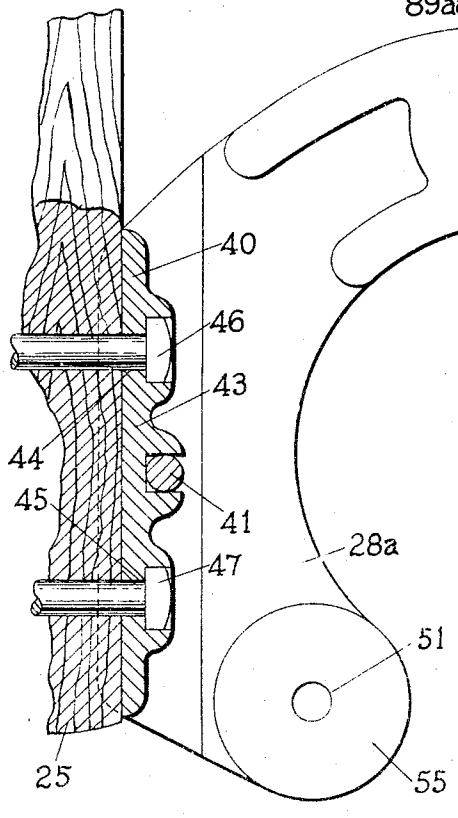


Fig. 7

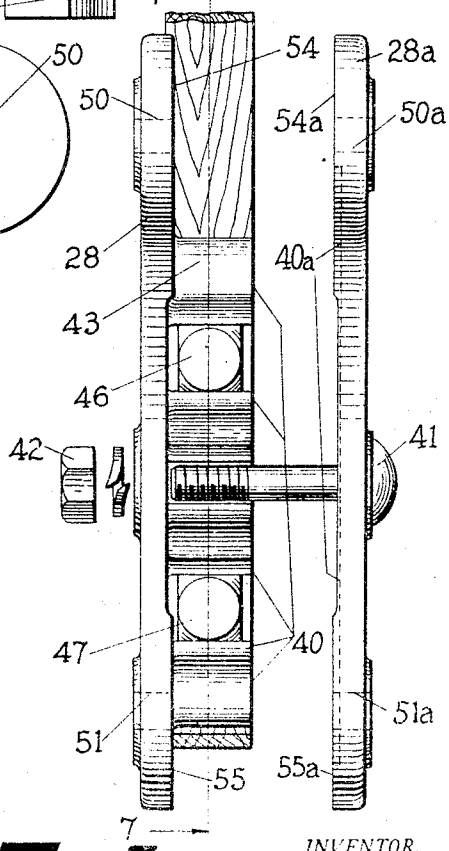


Fig. 6

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UNITED STATES PATENT OFFICE

2,506,145

PICKER STICK GOVERNOR MECHANISM

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Application February 28, 1948, Serial No. 11,915

10 Claims. (Cl. 139—149)

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This invention relates to weaving looms, and more specifically to picker stick governor structures for looms of the fly shuttle type employing a picker-stick actuated picker.

Looms of the type to which the invention is particularly directed employ one or more shuttles which may be received in a shuttle box and picked therefrom by a picker, the latter being secured to the upper end of a picker stick which is suitably actuated to impart picking and return motions to the picker. The motion of the picker, relative to the shuttle box in which it operates, is desirably translatory in character, so only axially directed forces are applied to the shuttle in the picking action. Looms as commercially manufactured are usually provided with mechanism which applies a force to the picker stick intermediate its ends and with mechanism for controlling movement of the lower end of the stick in such manner that the upper end of the stick and the picker thereon are moved in a curved path which approximates more or less closely the rectilinear path desirably followed by the spur of the shuttle being picked. Further, mechanism for checking or arresting the motion of the stick to terminate the picking and return strokes thereof is provided, generally in the form of a closed loop of leather in the form of a strap and encircling the stick and anchored to a part of the loom lay in a fashion to limit the travel or extent of stroke of the stick, and frictioned so as to absorb the kinetic energy possessed by the stick and associated parts as they approach the limits of their movements. Also, a mechanism is usually provided for inducing return movement of the picker stick toward picking position following termination of a picking stroke, which movement may be completed by entry of the same or another shuttle into the shuttle box.

With looms operating at or near their rated speeds, as, for example, from 180 to 200 picks per minute, the above mentioned mechanisms operate satisfactorily to perform their intended functions. However, when substantial increase in loom operating speed is attempted, as is the general tendency at the present time, difficulties are encountered in operation of those mechanisms. The upper end of the picker stick and the picker attached thereto then do not follow the same paths followed at normal loom speeds, the picker stick tending to jump vertically during its strokes. This jumping causes very irregular picking to occur, and also causes an excessive amount of shuttle spur loosening due to application of non-axially directed blows to the shuttle

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spurs. Similarly, the return and checking of the picker stick are not consistent or uniform; and the check straps are given abnormal movements and are caused to wear excessively, necessitating frequent and expensive replacement.

Much time and money has been expended in efforts to improve upon picker stick motions and checks, but none of the previously proposed improvements has thus far attained commercial success. Many of the proposed structures have been too costly to be practical, others have been lacking in adjustability or have been otherwise incapable of satisfactorily performing the intended functions, and none has been found to operate satisfactorily at exceptionally high loom operating speeds. For example, many of the suggested structures have been cumbersome and have so added to the inertia of the lay as to prohibit high speed operation of the lay, and some have failed structurally when thus operated. Another objectionable feature of previously suggested structures of the type under consideration is that adjustments thereof, if at all possible, necessarily had to be effected with the loom quiescent, which rendered inevitable a time-consuming and tedious trial-and-error method of arriving at an adjustment which could then never, except by accident, be precisely that desired.

With the above objectionable features and disadvantages of prior art picker stick controlling mechanisms in view, it is an object of the invention to provide a picker stick governor mechanism capable of effectively performing all of the above mentioned functions of checking the picker stick in both directions of its motion, inducing return motion of the stick toward picking position, and restricting picking movements of the picker to those wherein a selected point within the outline of the picker is caused to travel in a rectilinear path relative to the associated shuttle box, the several parts being so constructed and arranged as to permit effective operation at exceptionally high loom operating speeds. Another object of the invention is to provide a picker stick governor mechanism capable of checking the picker stick with different degrees of checking action on its picking and return strokes, and permitting ready adjustment of the checking action during loom operation, whereby adjustment of that action can be quickly and precisely effected. Another object of the invention is to provide a picker stick governor mechanism constructed and arranged to check the picker stick with different intensities of checking action on its picking and return

strokes, to induce return movement of the stick toward picking position following a picking stroke and to a selected extent, and to permit ready adjustment of each of those actions during loom operation. Another object of the invention is to provide a picker stick governor mechanism capable of satisfactorily performing stick checking and return functions and effecting rectilinear motion of a point within the outlines of an associated picker, all during exceptionally high speed loom operation. Another object of the invention is to provide means for ready adjustment of the checking and return actions of a picker stick governor mechanism. An additional object is to provide a picker stick governor mechanism arranged for oscillation with the lay and effective to satisfactorily perform the above mentioned functions usual to such mechanisms at exceptionally high loom operating speeds and effective to reduce the inertia forces involved in lay oscillation. Another object of the invention is the provision of a picker stick governor mechanism of unitary form possessing improved operating and adjustment characteristics. An additional object is to provide general improvements in a fly-shuttle loom.

The above recited and other objects of the invention that will hereinafter become apparent are attained by the invention, a preferred structural embodiment of which is fully disclosed in the following description considered in conjunction with the accompanying drawings forming a part of this specification.

In the drawings:

Fig. 1 is a pictorial view depicting only so much of conventionally fly-shuttle loom structure as is necessary to a full understanding of the invention, with governor structure according to the invention thereto applied;

Fig. 2 is a pictorial view of structure shown in Fig. 1 but from a different point of view than that of Fig. 1 and on a different scale;

Fig. 3 is a pictorial view from the rear, showing structure illustrated at the lower part of Fig. 1;

Fig. 4 is a view in front elevation of a base element forming a part of a base device according to the invention;

Fig. 5 is a sectional detail view taken substantially along line 5—5 of Fig. 4, and in the direction there indicated;

Fig. 6 is an exploded view in end elevation of a bracket device according to the invention, with a portion of a conventional picker stick thereto adapted to be secured;

Fig. 7 is a sectional view taken substantially along line 7—7 of Fig. 6 and in the direction there indicated, with portions broken out to show details;

Fig. 8 is a bottom view in section taken on a substantially horizontal plane including line 8—8 of Fig. 1 and in the direction there indicated;

Fig. 9 is a pictorial view of a portion of a check device according to the invention;

Fig. 10 is an end view of structure comprised in a picker stick return device according to the invention;

Fig. 11 is a sectional view taken along a plane including line 11—11 of Fig. 10 and in the direction there indicated, with a portion of the aforementioned base element included by means of dotted lines to indicate an assembled relationship of parts;

Fig. 12 is a detail sectional view taken substantially along line 12—12 of Fig. 10 and in the direction there indicated; and

Fig. 13 is a sectional detail view of cam, follower, and follower pin and bearing structures utilized in the governor mechanism.

The loom to which the illustrated embodiment of the invention is shown as applied is of a conventional type having a lay which oscillates or rocks forwardly and rearwardly of the loom about the axis of a rocker shaft extending across the loom near its bottom. Referring to the drawings and to Fig. 1 in particular, numeral 20 designates a conventional rocker shaft upon which is supported for oscillatory movement a lay largely not shown but including a lay end 21 and a shuttle box 22. The shuttle box is arranged to receive a shuttle 23 which is operated or picked from the box toward the opposite side of the loom by a picker 24 secured to the upper end of a picker stick 25. The picker stick is actuated in the picking direction (to the right as viewed in Fig. 1) by a lug strap 26 encircling the stick and connected to power means (not shown). The structure thus far enumerated, and its operation, are conventional and well understood by those skilled in the loom art, and need not herein be further described. In attaining the objects of the invention there is provided a novel unitary mechanism which is supported on and from rocker shaft 20, the mechanism including a base device comprising a base element 27, a bracket device including a pair of opposed bracket elements 28 and 28*a*, a check device including a friction wheel 29, and a return device including a spring 30, all as will hereinafter be more fully described and explained. It will be noted from a consideration of Fig. 1 that the mentioned novel mechanism is located close to the axis of rocker shaft 20, with the result that the inertia forces involved due to oscillation of the lay are much smaller than those involved in conventional picker stick controlling apparatus employing the usual check strap and friction devices.

Referring to Figs. 2 and 5, base element 27 is provided with a hub-like extremity 31 provided with a bore 32 into which a respective end of rocker shaft 20 is received and secured by suitable means such as set screws 33, 34 which are fitted in tapped holes in extremity 31 as indicated. Thus the base element is constrained to oscillate with the rocker shaft about the axis of the latter and synchronously with the loom lay. The base element, forming with its set screws a base device, acts as a support for the picker stick carrying bracket elements 28, 28*a*, for the check device including friction wheel 29, and for the aforementioned return device. To that end the base element (see Fig. 4) is provided with a pair of cams formed in part by cam apertures 35, 36 and in part by flat surfaces surrounding the apertures on the opposite faces of the element and all acting to support and guide the bracket device, a pair of apertures 37, 38 for securing the check device, and an aperture 39 for securing the return device, as will presently be explained in detail.

Bracket elements 28, 28*a* forming parts of the mentioned bracket device, are provided as indicated in Figs. 6 and 7 with opposed, abutting, machined surfaces 40, 40*a* respectively, whereby the two elements may be accurately and firmly secured together as a unit by suitable means such as bolt 41 and nut 42. Bracket element 28 is provided with a flange 43 (see Fig. 7) provided with socketed apertures 44, 45 arranged for reception of respective bolts 46, 47 employed in securing the lower end of picker stick 25 to the bracket element. Bolts 46, 47 also extend

through suitable, spaced holes formed in the picker stick, through a slot aperture 48a in a lug strap guide or power block 48 (see Figs. 1 and 3), and through apertures in a backing plate 49, and have nuts and spring washers applied whereby the picker stick is firmly affixed at its lower end to and in tight engagement with, flange 43. Thus the picker stick and the picker thereon are forced to move as a unit with the bracket device.

As indicated in Figs. 6 and 7, bracket elements 28, 28a are provided with respective arms or extensions having aligned bores 50, 50a and 51, 51a arranged for reception of respective cam follower pins 52, 53 (see Fig. 1), each of the bores being surrounded on the inner face of the respective element by a respective one of machined surfaces 54, 54a and 55, 55a. The latter surfaces are arranged as follower or bearing surfaces to coact with the previously mentioned machined cam or bearing surfaces 35a, 35b and 36a, 36b formed on base element 27 around cam apertures 35, 36, as indicated in Figs. 2 and 3; it being understood that base element 27 and bracket elements 28, 28a are so formed as to provide a close guiding fit of the base element between the bracket elements. In view of the similarity between the cam follower structures at follower pins 52 and 53, only that at pin 53 will be described in detail, it being understood that the structure at pin 52 is similar in all respects except as hereinafter noted. Referring to Fig. 13 wherein a sectional view through the cam and follower structure at pin 53 is depicted, the pin is provided, between bracket elements 28, 28a, with a follower roll bearing indicated generally at 56, which preferably is of the needle type having inner and outer races, on which bearing is carried with a close fit a hardened follower roll 57 which is so dimensioned as to ride freely between elements 28, 28a but has a close fit within the closed curved cam surface of cam aperture 36 in the base element 27. Pin 53 further is dimensioned to provide a close fit within apertures 51, 51a of bracket elements 28, 28a. At one end pin 53 is threaded and carries a spring washer and nut whereby the pin may be secured in place on elements 28, 28a and the latter maintained in snug sliding engagement with base element 27. At its other end pin 53 is provided with a head 59 of circular cross-section, terminated by a squared portion 60 for application of a wrench or other holding tool. Portion 60 may be provided with a tapped recess to receive a lubricant nipple 61 of well known type whereby lubricant may be forced through a bore 62 formed in the pin and communicating with a passage formed through the inner race of bearing 56, whereby the cam and follower surfaces and follower bearing may be lubricated. In consequence of the described construction, and since follower or bearing surfaces 54, 54a and 55, 55a on bracket elements 28, 28a bear closely against mating cam or guide surfaces 35a, 35b, and 36a, 36b, respectively, on base element 27, the bracket device is restricted to movements in planes containing the axis of the rocket shaft and planes co-parallel with such planes, and is further restricted to movements according to the shapes of cam apertures 35 and 36 which closely guide their respective follower rolls. Cam apertures 35 and 36 are laid out in accordance with ordinary principles of kinematics so that a desired selected point on or within the outline of picker 24 will be restricted to pure translation relative to shuttle box 22 and travel in a straight line along or parallel to the axis of the box. The desired point may be selected as the point at the bottom of the usual conical recess in the picker, or a point on the surface of the recess, or a point not actually on nor in the picker body proper but within the general outline of the picker, according to the design of the loom to which the novel mechanism of the invention is to be applied and the nature of the interengaging surfaces of the picker and the shuttle; but such that the resultant of the forces applied to the shuttle by the picker during the picking stroke is substantially along the axis of the shuttle tip or spur.

As previously mentioned, picker stick 25 is moved in a direction to cause picking of the shuttle, that is, to the right as viewed in Fig. 1, by means including a lug strap 26, in a well known manner and fashion. To induce return movement of the stick toward picking position following termination of a picking stroke, the novel mechanism of the invention includes a return device which in the illustrated embodiment is supported by and upon base element 27 and which acts to store energy in a spring during the picking stroke and to use energy thus stored to induce return of the picker stick, picker and bracket means toward their positions as shown in Fig. 1. It will be understood that the return movement induced by the return device need not carry the stick all of the way to picking position; but may and preferably does continue only until the picker is positioned a selected distance inwardly of its outermost position in the shuttle box, so the kinetic energy of the incoming shuttle may be absorbed in completion of movement of the stick and associated mechanism to initial picking position. As will hereinafter be made apparent, the return device is arranged to be susceptible to easy adjustment to provide precisely the desired extent of return movement of the picker stick.

The return device, which is depicted in detail in Figs. 10, 11 and 12, comprises a pivot pin 63 having a squared head 64, a bearing section 65 of circular cross-section, a shank 66 of reduced diameter, and an intermediate flatted anchor seat section 67 forming with sections 65 and 66 respective shoulders 68 and 69. Shank 66 is threaded to receive a nut and spring washer as indicated. Mounted for free rotation on bearing section 65 of pin 63 is a spring cup 70 having an external flange 71 longitudinally slotted as at 72 and having an internal spring-receiving cavity 73 which largely encloses the previously mentioned spring 30. One end of the spring is bent outwardly to form a hook which is received in slot 72 and engages around the edge of flange 71 as indicated in Fig. 10. The other end of spring 30 is bent inwardly and hooked about an end of a slotted flange 74 of a spring anchor 75 mounted on sections 66 and 67 of pin 63 as depicted in Figs. 10, 11, and 12. As indicated in those figures, anchor 75 is provided with a bore 76 receiving shank 66 and a recess 77 of rectangular cross-section into which the flatted anchor seat section 67 of pin 63 fits with shoulder 69 at or near the bottom of the recess, whereby the anchor is constrained to rotate with pin 63 in either direction of rotation. It is evident that rotation of cup 70 about pin 63 in a counterclockwise direction as viewed in Fig. 10 will act to tension spring 30 if pin 63 is held fixed. As indicated in Fig. 11, the pin is held in fixed and adjusted position relative to base element 27 by means of the nut on shank 66, the latter extend-

ing through aperture 39 of the base element and shoulder 68 of the pin pressing anchor 75 tightly against the base element. Similarly, assuming rotation of cup 70 is restrained (in a manner to be presently explained) spring 30 may be adjustably tensioned by loosening the nut on shank 66, rotating flatted head 64 of pin 63 in the proper direction as by means of a wrench until the desired tensioning is effected, and tightening of the nut while restraining head 64 from rotation. To permit energy to be stored in spring 30 and derived therefrom, cup 70 is formed with a depending tail 78 (see Figs. 3 and 10) which is adapted to be moved to impart spring-tensioning rotation to cup 70 and to reversely move under the action of the spring to induce return movement of the bracket device and picker stick, all in a manner to be hereinafter explained in detail.

It will be understood that a picker stick check device should operate to check or brake the picker stick movement in both the picking direction at the termination of the picking stroke and in the opposite (return) direction at the termination of the return movement; and that the two checking actions are necessarily of unequal intensities since much more energy must be absorbed in terminating the picking stroke than in terminating the return movement. In attaining the objects of the invention a check device is provided which performs the mentioned two-way checking function in the manner just noted, and which may be adjusted to vary either of the checking actions while the loom is in operation. The check device of the novel governor mechanism comprises a friction wheel pin 79 suitably shouldered and extending through aperture 37 of base element 27 and fixedly secured to that element to provide a bearing for free rotational support thereon of previously mentioned friction wheel 29, in the manner indicated in Figs. 2 and 3. Friction wheel 29, illustrated in detail in Fig. 9, comprises a hub 80 axially bored to accurately fit upon pin 79, a head 81 having two arms, 82 and 83, and a friction drum 84, preferably all formed integrally as indicated. Drum 84 has a finished outer cylindrical surface concentric with the hub bore and arranged to coact with a friction band in a manner to be presently explained. Arm 82 is provided with a bored enlargement at its end, the bore being tapped to receive an adjustable actuator screw 85. Similarly, arm 83 is provided with a bored enlargement in which is threadably received an adjustable actuator screw 86. Screws 85 and 86 are similar and each has a head and a reduced squared portion at the end opposite the head for application of a wrench for adjusting purposes; and each screw may be locked in adjusted position by a respective lock nut as indicated. Fixedly mounted in aperture 38 of base element 27 in a manner indicated in Fig. 8 is a friction lever pivot pin 87 (see Fig. 3). Referring to Fig. 8, pin 87 has mounted thereon for free pivotal movement between its head 88 and base element 27, a bifurcated friction lever 89 having bored legs 89*a*, 89*b* whose bores are aligned and closely accommodate pin 87. Referring again to Fig. 3, lever 89 has an upstanding lever arm terminated by a bored head 90 whose bore is tapped to receive therethrough a threaded adjustable actuator screw 91 carrying a lock nut as indicated. It will be evident from a consideration of Fig. 8 that the lever arm is only slightly offset from leg 89*a*, but is relatively widely offset from leg 89*b*, for clearance purposes to be hereinafter explained. Each of legs 89*a*, 89*b* is formed with a respective bored protuberance 89*aa*, 89*bb* whose bores are aligned and receive a friction band anchor pin 92 which is arranged parallel to pin 87 and anchors between the two protuberances a looped end of a friction band 93 which nearly encircles friction drum 84. Anchor pin 92 may be retained in position by any suitable means, as by having a head at one end and a cotter pin at the other end as indicated in Fig. 3. Friction band 93 may be provided with any suitable friction facing, as illustrated. The opposite end of band 93 is looped and bifurcated to accommodate the T-head of a T-bolt 94 as indicated in Figs. 3 and 8. The shank of the T-bolt extends through a bore 95 formed transversely through pin 87, and has threaded thereon a friction band tension adjusting nut 96 having a crenelated base 97 which is adapted and arranged to coact with pin 87 to hold the nut in adjusted position. Opposed surfaces of pin 87 disposed between legs 89*a*, 89*b* may be formed with ridges such as shown at 98 for cooperation with the crenelations of nut 96, to enhance locking of the nut in adjusted position. It will be observed that rocking of lever 89 away from pin 79 will cause increased tensioning of friction band 93 on the friction wheel, and that the initial tension may be regulated by rotation of nut 96.

Referring now more particularly to Fig. 3, arrangement and operation of the hereinabove disclosed mechanism is explained as follows, commencing with the picker stick in initial picking position, with spring 30 lightly tensioned sufficiently to press tail piece 78 into contact with pin 52, in whose path it is positioned, and with pin 52 in contact with the head of actuator screw 85: As the stick moves to the left the cam and follower means comprised in the base device and the bracket device and including base element apertures 35, 36 and their adjoining surfaces, follower rolls 57 (one in each of apertures 35, 36), and surfaces 54, 54*a* and 55, 55*a*, act to restrict movement of a point at the picker to rectilinear motion relative to the shuttle box, whereby jumping and other irregular motion of the picker stick is prevented. Movement of the stick (and the upper part of the bracket device) to the left immediately causes follower pin 52 to rotate spring cup 70, thereby storing energy in spring 30 by tensioning thereof. This tensioning action continues throughout movement of pin 52 to the left, that is, during all of the picking stroke of the picker stick. Prior to the end of the picking stroke, but preferably subsequent to completion of acceleration of the shuttle by the picker, pin 52 engages actuator screw 91 of friction lever 89 and rotates the lever about pin 87, applying increasing tension to friction band 93 which was previously only relatively lightly tensioned. While pin 52 is rocking lever 89, the pin also engages actuator screw 86 of friction wheel 29, lever arm 89 being offset from leg 89*b* to clear arm 83 and screw 86 of the friction wheel to permit this action. Thus further movement of pin 52 to the left must cause rotation of wheel 29, which rotation is increasingly resisted by the continued tightening of band 93. Hence motion of pin 52 (and of the picker stick) to the left is quickly but smoothly arrested, spring 30 in the meantime having been sufficiently tensed to cause quick commencement of return movement of pin 52 and the picker stick toward initial picking position. This reverse or return movement is at first entirely unimpeded by action

of the check device including wheel 29, pin 52 merely moving away from actuator screw 86. In fact the return movement may be aided somewhat by the return of friction lever 89 to neutral position under the action of tensed band 93. Friction wheel 29 having been rotated counterclockwise (as viewed in Fig. 3) during the picking stroke, has thus positioned its actuator screw 85 in the return path of pin 52. At a selected point in that return path the pin engages screw 85 and thus causes reverse (clockwise) rotation of wheel 29, which has by that time been relieved of all of the frictioning caused by the action of lever 89 and is resisted by only such normal frictioning as is applied by the band and as determined by the regulation of nut 96. Reverse rotation of wheel 29 (and consequently return motion of pin 52 and the picker stick) is thus gently arrested with spring 30 still slightly tensioned and with the picker at a desired position in shuttle box 22, usually between one and two inches inwardly from its normal picking position. From that desired position the picker is moved to active picking position by a shuttle entering box 22, the latter action causing completion of the resetting of the picker stick, bracket device, and friction wheel 29. The extent of the return movement of the parts that is accomplished by spring 30 is adjustable by adjustment of the tension of the spring, coordinated with adjustment of screw 85 of friction wheel 29 and nut 96 on T-bolt 94 and will, as previously indicated, vary according to several loom operating factors such as loom speed, shuttle weight, and shuttle box binding action. It will be understood that follower pin 52 is made of the length required to permit engagement thereof with screws 85, 86 and 91 and with tail 78 as indicated, the latter parts and associated structures supporting them being arranged and shaped to provide necessary clearances for operation in the manner described. Cam follower pin 53 need not be as long as pin 52, as is deemed to be evident. The follower roll and bearing structure on pin 52 may be identical to that employed on pin 53, or merely similar. The several pins may be provided with lubrication means similar to that described in connection with pin 53 whereby the bearing surfaces may be properly lubricated. Adjustment of initial tension in band 93 may be effected by rotation of nut 96 on T-bolt 94, and adjustment of final checking tension in the band may be adjusted by rotation of screw 91 in lever 89. Adjustment of the effective throw and action of friction wheel 29 may be effected by adjustment of one or both of screws 85, 86. In each case, the parts may be retained in adjusted positions by the described locking means such as lock nuts. It will be noted that due to placement of all of the adjusting means of the picker stick governor mechanism near the axis of rocker shaft 20, where the amplitudes of their synchronous oscillations with the lay are small, and due to open exposure of those adjusting means, all of the hereinabove mentioned adjustments may be effected while the loom is in operation. As is well known, picker stick check and return devices must vary in action in accordance with loom speeds, shuttle weights and other operating factors, and it is accordingly very desirable that those devices be susceptible to easy adjustment; and it is evident that it is highly desirable that adjustment of the devices be permitted while the loom is in operation. These important and desirable features are characteristics of the

governor mechanism of the illustrated embodiment of the invention.

It will be understood that while I have illustrated and described a picker stick governor mechanism at only the left side of the loom, substantially similar structure of opposite hand may be located at the other side of the loom and similarly mounted as a unit on rocker shaft 20. Further while I have for the sake of brevity and conciseness illustrated only one specific embodiment of the invention including one specific parallel-motion device, one specific stick return device and one specific check device, it will in view of my disclosure be evident that other forms of such devices may be employed and that modifications of the disclosed embodiment of unitary governor mechanism will occur to those skilled in the art. Accordingly I do not desire to be limited to the specific details of the illustrated embodiment of the invention, but what I claim is:

1. In a loom having an oscillatory shuttle box, a shuttle receivable in the shuttle box, and picking means including a picker stick and picker thereon and effective to have a return stroke and a picking stroke to pick said shuttle from the shuttle box, in combination therewith: a base device including a base oscillatable synchronously with said box; a bracket device including means firmly supporting the picker stick thereon; interengaging cam and follower means on said base and bracket device and supporting the bracket device on the base and confining movement of a point in the outline of said picker to rectilinear motion relative to said shuttle box; a check device including brake and brake-applying means on said base; a bracket and stick return device including a spring means on said base; and means on said bracket device actuating said return device and said brake-applying means upon movement of the picker stick in a picking stroke and further acting to relieve said brake applying means on the return stroke of the picker stick; whereby said return means is stressed and said brake is applied to check momentum of said picker stick to terminate the picking stroke and said return device induces return movement of the picker stick following termination of the picking stroke.

2. In a loom having a rocker shaft, lay means oscillatable with said shaft and about the axis thereof and including a shuttle box, a shuttle receivable in the shuttle box, a picker effective upon picking movement thereof to pick the shuttle from the box, a picker stick carrying the picker at one end of the picker stick adjacent said box and disposed with its other end adjacent the axis of said shaft, and actuating means acting to impart picking movement to the picker stick and picker, in combination therewith: a base device fixed on said rocker shaft and oscillatable therewith about the axis of the shaft; a bracket device secured to said stick adjacent said other end thereof and movable in opposite directions between limits; cam and follower means on said base device and bracket device and acting through said picker stick constrain a point within the outline of said picker to rectilinear motion relative to said shuttle box; a check device including interacting means on said base device and said bracket device and acting to check extremes of travel of the bracket device in said directions; and a return device including that interacting means on said bracket device which functions with the check device and a

resiliently urged member acting to induce return movement of the bracket device and picker stick following actuation of the latter by said actuating means.

3. A picker stick governor mechanism including in combination: a base device including a base having a hub and a portion presenting opposite parallel faces and cam-element forming apertures therethrough between the parallel faces; a bracket device including a pair of opposed bracket elements having the picker stick clamped therebetween, each element presenting one of two spaced-apart parallel guide faces, and means securing said elements together as a rigid unit with said guide faces in working contact with a respective one of said opposite parallel faces of said base; and a plurality of cam follower means on said bracket device, each said means engaging said base within its respective one of the said apertures to be closely guided thereby; whereby movement of a selected point on said bracket device is restricted to a desired prescribed path relative to said base.

4. Picker stick governor mechanism for looms of the type having a lay mounted upon a rocker shaft, which includes the combination with a picker and picker stick of a base attached to the rocker shaft and movable therewith, a means to which the picker stick is connected and cooperating, positive cam and follower means functioning between said base and means to which the picker stick is connected for operatively interconnecting the two and for constraining the picker to move in a predetermined pathway, means for returning said stick and the means to which it is connected after each picking movement, and checking means operative between the base and means to which the stick is connected and comprising a brake drum and band effective with increasing force in one direction of movement and at a point adjacent the extremity of travel only for resisting movement therebetween with one amount of force when the stick approaches the end of its travel in one direction, and for resisting movement between the parts with a different amount of force when the stick approaches the end of its travel in the opposite direction.

5. Picker stick governor mechanism for looms of the type having a lay mounted upon a rocker shaft, which includes the combination with a picker and picker stick of a base attached to the rocker shaft and movable therewith, a bracket to which the picker stick is connected and cooperating, positive cam and follower means functioning between said base and bracket to which the picker stick is connected for operatively interconnecting the two and for constraining the picker to move in a predetermined pathway, a resilient means for returning said stick and the bracket to which it is connected after each picking movement, and a checking means operative between the base and bracket to which the stick is connected which comprises a drum mounted for limited rotation on said base, a friction brake connected to said base and a contact member projecting from said means to which the picker stick is connected and engageable with a portion of said drum when the stick and bracket are moved in one direction and with an opposite portion of said drum when the stick and bracket are moved in the other direction, and means affecting said friction brake upon movement of the bracket and stick in one direction to resist movement between the bracket and base with one amount of retarding force when the stick approaches the end of its travel in one direction, said friction brake being operative for resisting movement between said parts with a different amount of retarding force when the stick approaches the end of its travel in the opposite direction.

6. Picker stick governor mechanism for looms of the type having a lay mounted upon a rocker shaft, which includes the combination with a picker and picker stick of a base attached to the rocker shaft and movable therewith, a means to which the picker stick is connected and cooperating positive cam and follower means functioning between said base and means to which the picker stick is connected for operatively interconnecting the two and for constraining the picker to move in a predetermined pathway, resilient means for returning said stick and the means to which it is connected after each picking movement, said means comprising a spring one end of which is relatively fixed with respect to said base, and the other end of which is attached to a movable means having extending therefrom a projecting arm, and checking means operative between the base and means to which the stick is connected for resisting movements therebetween with one amount of force when the stick approaches the end of its travel in one direction, and for resisting movement between the parts with a different amount of force when the stick approaches the end of its travel in the opposite direction, said checking means comprising a drum rotatable upon a pivot means extending from said base, spaced arms projecting from said drum and a stop member on each arm, a friction brake band passing about said drum and an operating lever to which one end of said band is connected, said lever being pivoted at said base and having at its relatively free end a stop member in substantial alignment with the adjacent stop member on one of said spaced arms projecting from said drum, a projecting contact element extending outwardly from said bracket to which the picker stick is connected, said element being so positioned as to contact the arm projecting from that movable means to which the said spring is connected and also with the stop members at one of the arms for the drum and the relatively free end of said lever to which the brake band is connected when the stick is picked in one direction thereby to energize the spring and to rotate the drum against the retarding force of the brake band while affecting the brake band lever to tighten the band and to increase its retarding effect upon the drum and movement of the picker stick, said projecting element being effective when moved in the other direction to contact only the stop means on the opposite arm of the rotating drum thereby to retard movement of the picker stick with a force substantially less than that applied during the movement aforesaid.

7. Picker stick governor mechanism for looms of the type having a lay mounted upon a rocker shaft, which includes the combination with a picker and picker stick of a base attached to the rocker shaft and movable therewith, a means to which the picker stick is connected and cooperating, positive cam and follower means functioning between said base and means to which the picker stick is connected for operatively interconnecting the two and for constraining the picker to move in a predetermined pathway, means for returning said stick and the means to

which it is connected after each picking movement, and checking means operative between the base and means to which the stick is connected, and a common actuator member movable with said means to which the picker stick is connected and engageable with both the means for returning the stick and the means to which it is connected, and with the said checking means, for retarding the movement of the picker stick and picker in one direction of movement thereof, but engageable with only the said checking means for inducing a retarding of the movement of the picker stick at the terminal portion of the movement thereof in the opposite direction.

8. For a picker stick governor mechanism, a picker stick check which includes in combination, a drum rotatably mounted in juxtaposition to the stick, a friction brake member in pressure contact with said drum and a lever to which said brake member is connected and by which it may be applied with increasing force to the drum, and an actuator member movable with the stick for contacting the said lever after the stick has moved toward the end of its picking stroke thereby to apply increased checking force to the stick during picking strokes.

9. For a picker stick governor mechanism, a picker stick check which includes in combination, a drum rotatably mounted in juxtaposition to the stick, a friction brake band passing about said drum and in pressure contact therewith and a lever to which one end of said band is connected and by which the band may be applied with increasing force to the drum, and an actuating member movable with the picker stick for contacting the said lever after the stick has

moved toward the end of its picking stroke thereby to apply increased checking force to the stick during picking strokes.

10. For a picker stick governor mechanism, a picker stick carrying bracket, a base to which the said bracket is movably attached, and a picker stick check in combination therewith which includes a drum rotatably mounted on said base, a friction brake member passing in pressure contact with said drum and a lever to which said brake member is connected and by which it may be applied with increasing force to the drum, and an actuator member projecting from said picker stick carrying bracket, movable with the stick and bracket for contacting the said lever after the stick has moved toward the end of its picking stroke thereby to apply increased checking force to the stick during picking strokes as compared to the retarding effect of said checking means on strokes in the opposite direction.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
739,526	Whatley	Sept. 22, 1903
744,862	Goodwin	Nov. 24, 1903
779,902	Bevill	Jan. 10, 1905
825,049	Goodwin	July 3, 1906
1,311,053	Darlington	July 22, 1919
1,312,960	Demers	Aug. 12, 1919
1,428,739	Youngquist	Sept. 12, 1922