No. 656,181. Patented Aug. 21, 1900.

W. F. DRAPER.

SHUTTLE CHECK FOR LOOMS.

(Application filed Oct. 24, 1899.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

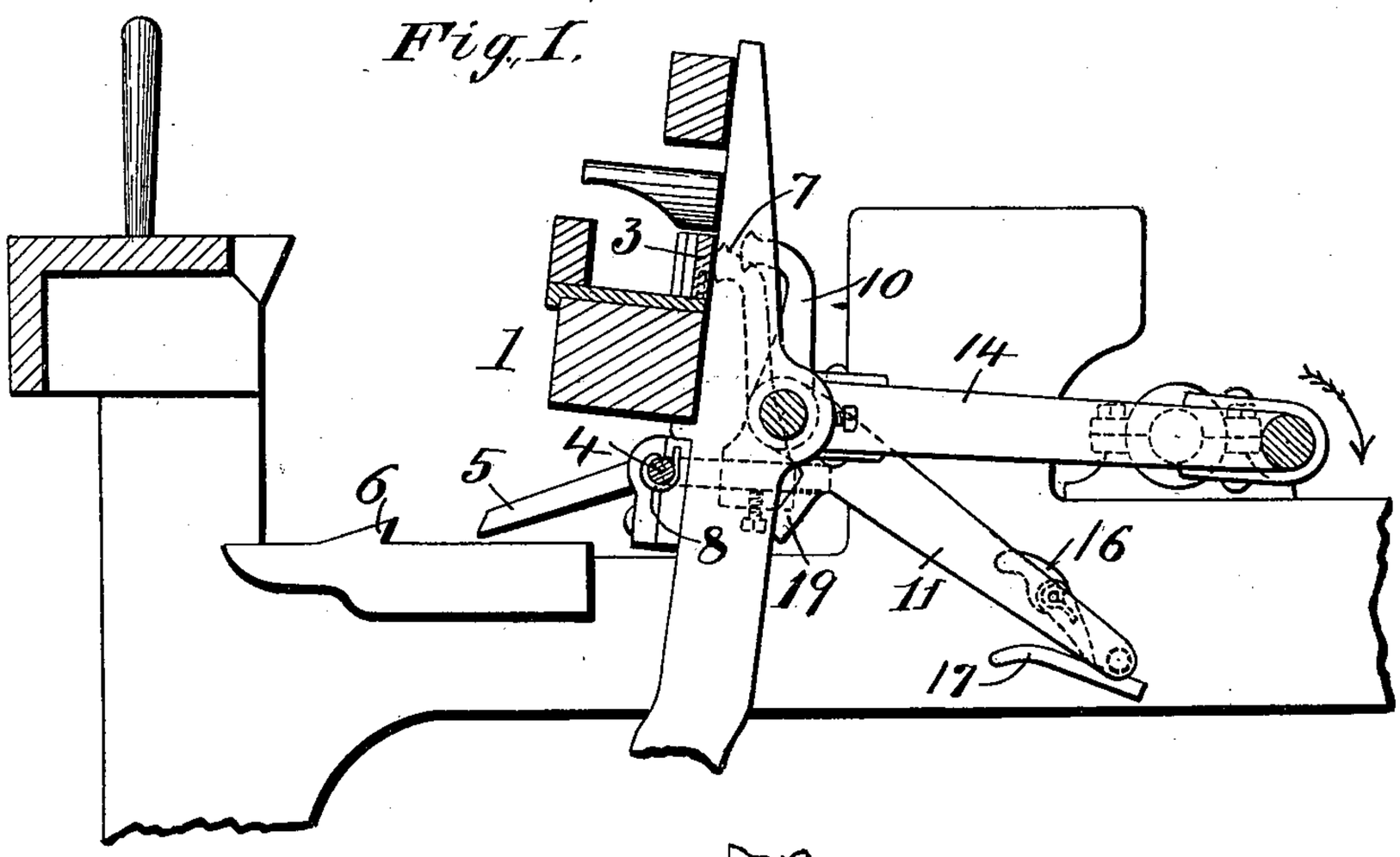
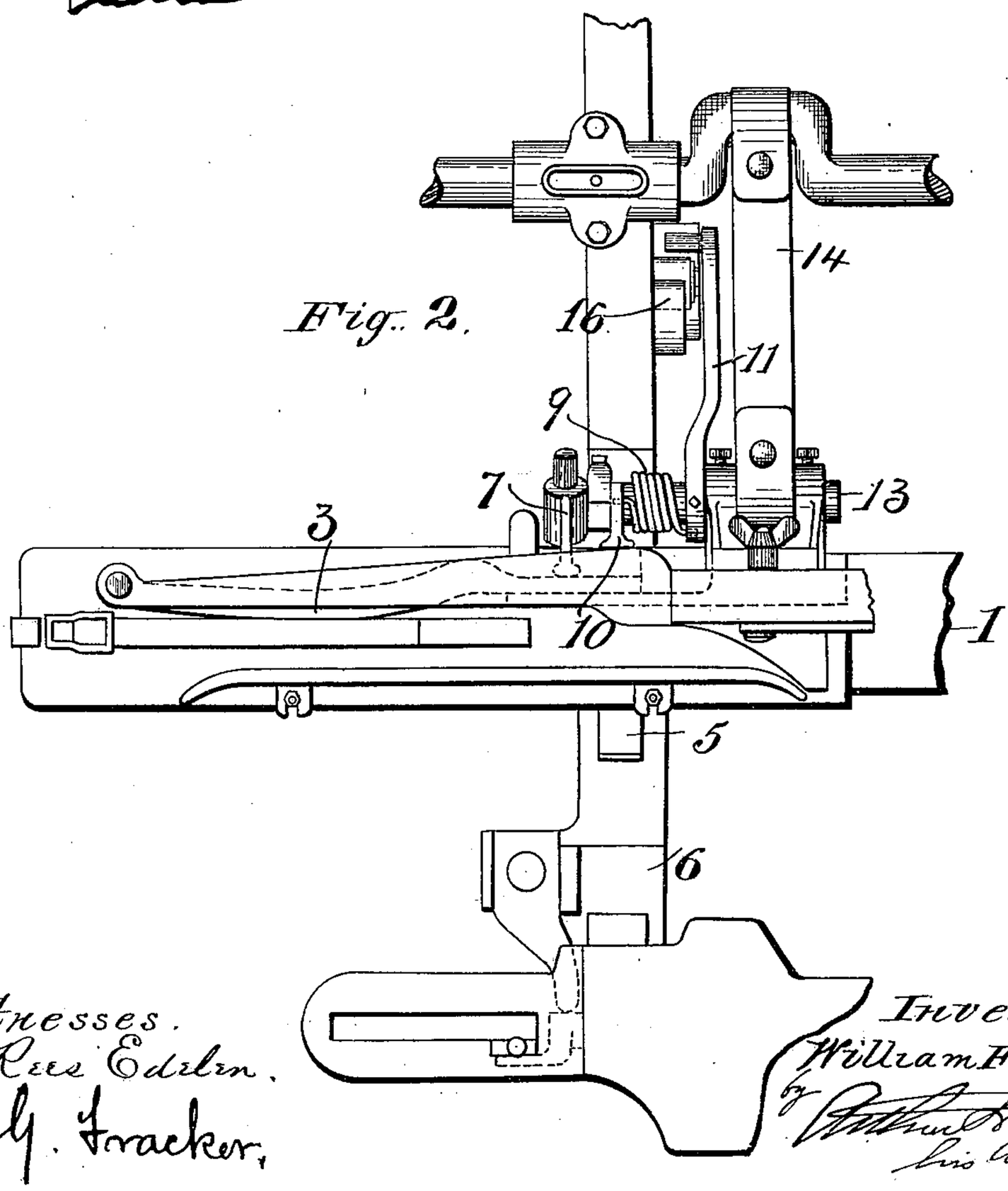


Fig. 2.



Witnesses.
W. Rees Edelen.
H. G. Fracker.

Inventor.
William F. Draper.
by Arthur S. Brown
his Attorney.

No. 656,181. Patented Aug. 21, 1900.

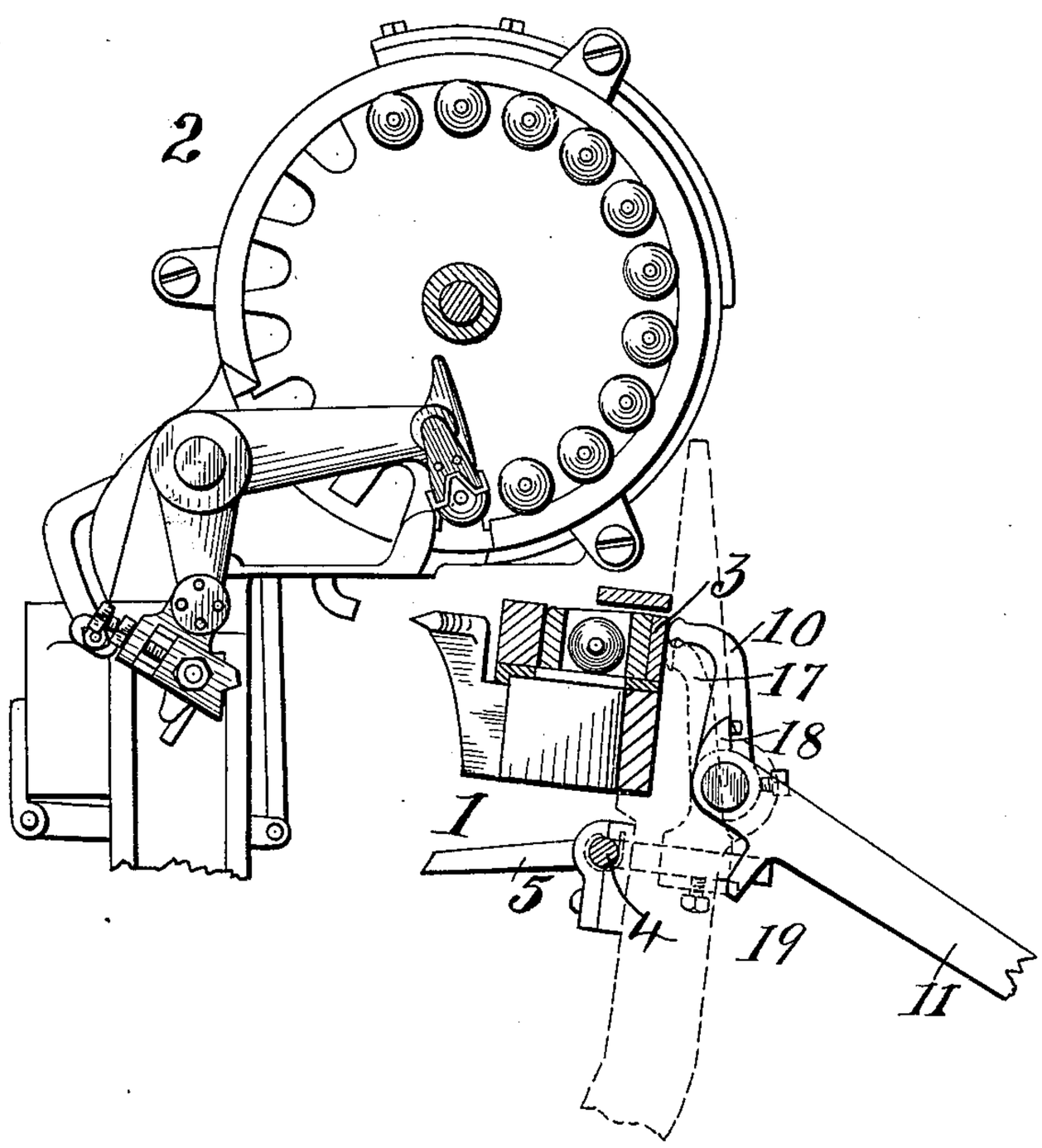
W. F. DRAPER.

SHUTTLE CHECK FOR LOOMS.

(Application filed Oct. 24, 1899.)

(No Model.) 3 Sheets—Sheet 2.

Fig. 3.



Witnesses.
W. Rees Edelen.
H. G. Fracker,

Inventor.
William F. Draper
by William F. Browne
his attorney

No. 656,181. Patented Aug. 21, 1900.

W. F. DRAPER.

SHUTTLE CHECK FOR LOOMS.

(Application filed Oct. 24, 1899.)

(No Model.) 3 Sheets—Sheet 3.

Fig. 4.

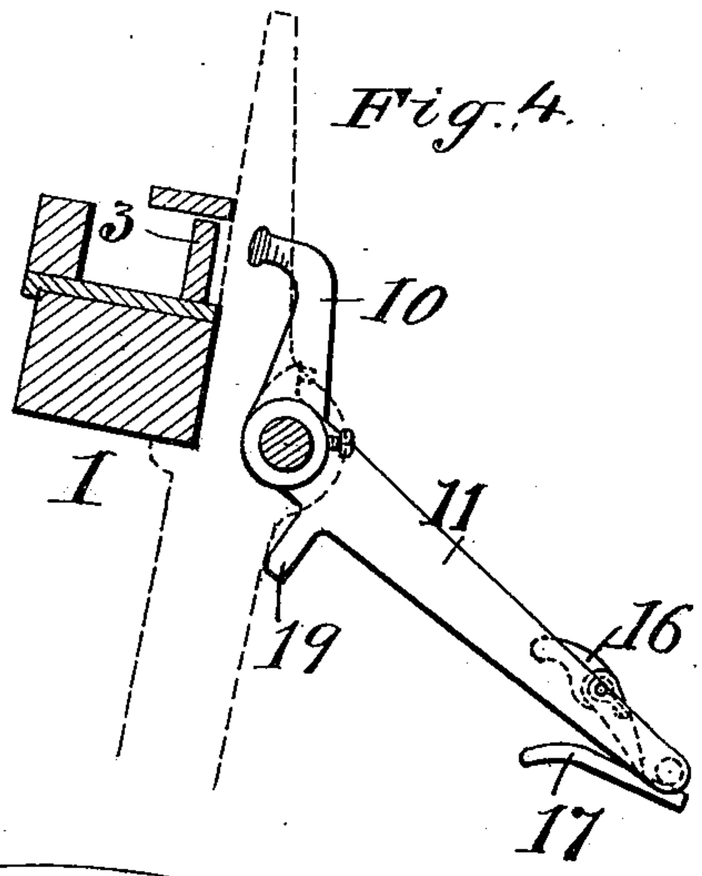


Fig. 7.

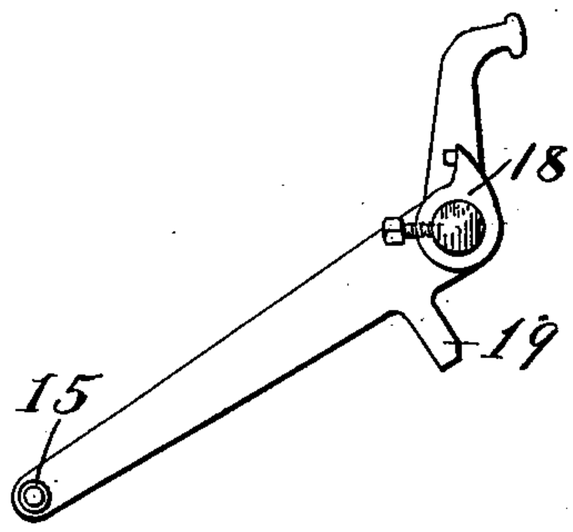


Fig. 5.

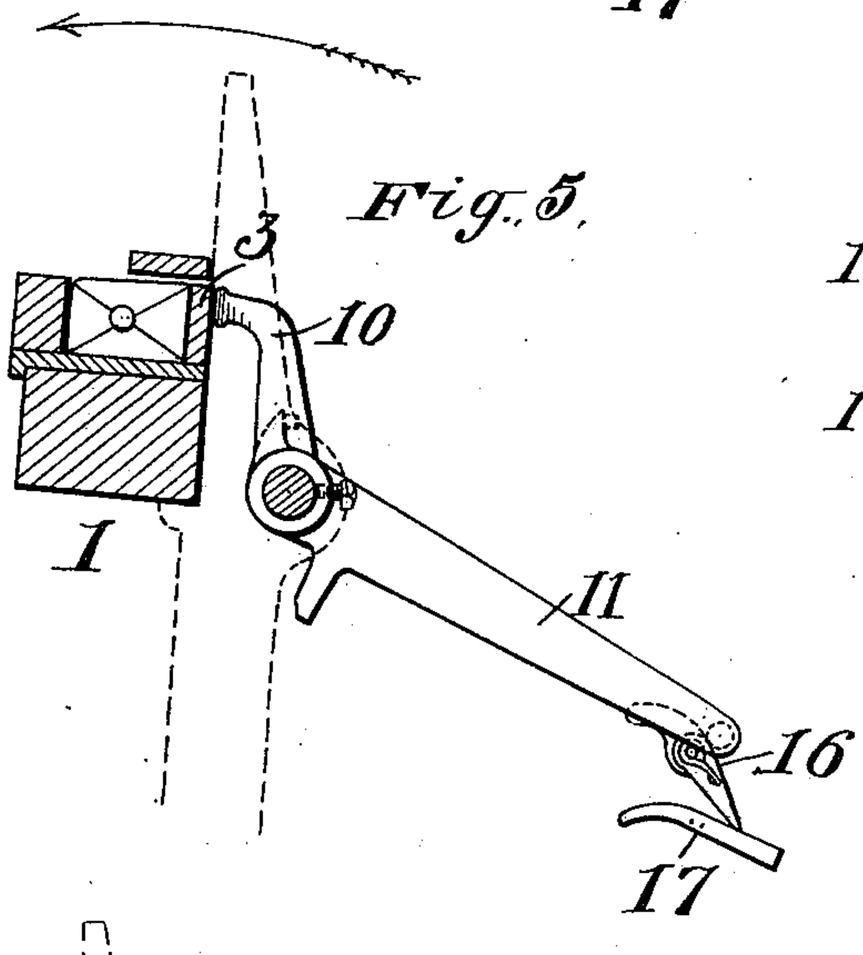


Fig. 8.

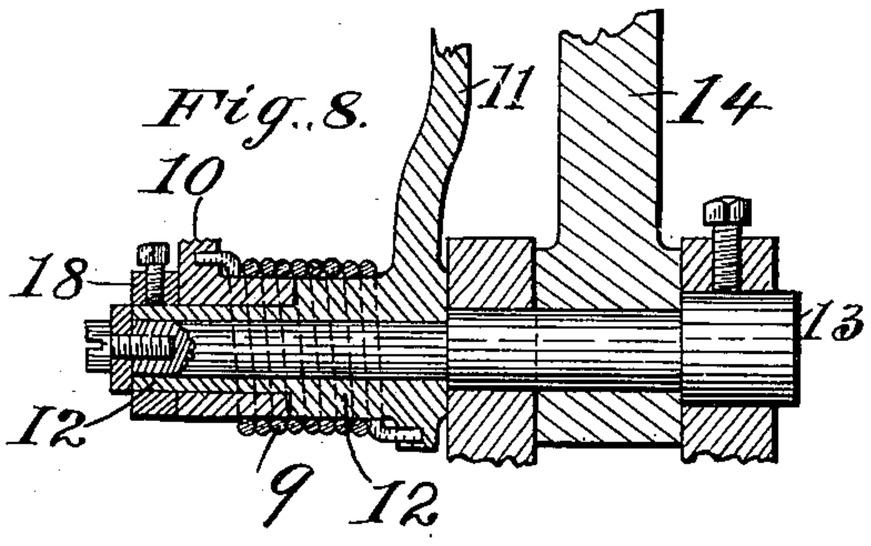


Fig. 9.

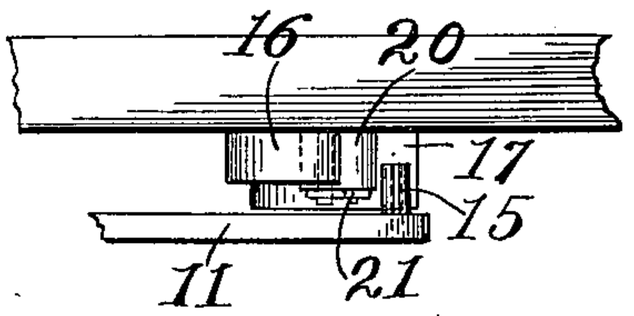
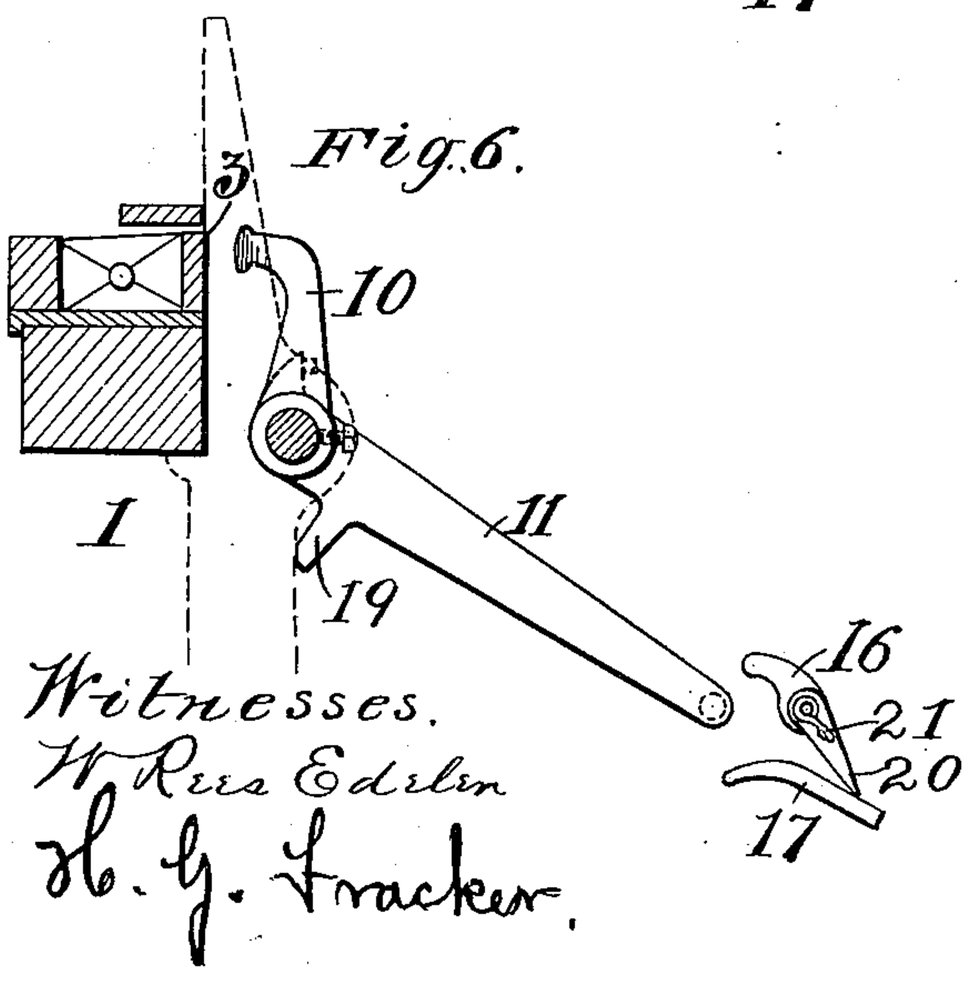


Fig. 6.



Witnesses.
W. Rees Edelen
H. G. Fracker.

Inventor.
William F. Draper
by Arthur L. Brown
his Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM F. DRAPER, OF HOPEDALE, MASSACHUSETTS.

SHUTTLE-CHECK FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 656,181, dated August 21, 1900.

Application filed October 24, 1899. Serial No. 734,598. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. DRAPER, of Hopedale, in the county of Worcester and State of Massachusetts, have invented a new and Improved Shuttle-Check for Looms, of which the following is a specification.

It is important in looms in which the filling or weft is automatically replenished that the shuttle should always occupy substantially the same place in the shuttle-box, so that in case fresh filling is to be inserted the spent or exhausted shuttle should be in the proper place in the shuttle-box to enable the insertion to be effected. This is true whether the replenishment of filling is effected by changing the shuttles entire—that is, by ejecting the spent shuttle and inserting a fresh shuttle, as in the Northrop United States Patent No. 454,805, dated June 23, 1891—since the ejection of the spent shuttle requires it to be properly positioned in the shuttle-box, or whether the replenishment of filling is effected by substituting a fresh bobbin or cop for the exhausted one in the shuttle, as in the Northrop Patent No. 529,940, dated November 27, 1894, since the shuttle must occupy a substantially-definite position to be enabled to receive the fresh bobbin or cop which is thrust into it. In case of a material variation in position of the shuttle in a shuttle-changing loom it will not be properly ejected, while in case of a material variation in the position of the shuttle in a bobbin-changing or cop-changing loom the fresh bobbin or cop may not be inserted so as to be held in the shuttle, so that the shuttle is not replenished with filling, and in some instances the bobbin or cop may be broken. It is therefore desirable and important that the loom be provided with means which shall always insure the shuttle being stopped in the shuttle-boxes in substantially the same place each time. To understand what is necessary to be done to secure this result requires a consideration of the causes which result in the improper boxing of the shuttle—that is to say, the stoppage of the shuttle at positions other than the proper position in the shuttle-box. Improper boxing of the shuttle is due in the vast majority of instances to ununiform picking. If a uniformly-effective pick could always be secured, uniform boxing might be achievable. Lack of uniformity in the pick, however, is inevitable. It may be due to various causes, but is mainly due to variation in the speed of the loom and to the circumstance that the pickers are necessarily connected to their driving-cams through loose connections, which involve a large amount of lost motion. In addition to ununiform picking irregularity in the adjustment of the binders acts in the same direction, since a variation in the resistance which the shuttle encounters in boxing is thus produced, which has the same effect in this regard as variation in the force of the blow imparted by the picker to the shuttle due to irregularity in the pick. Variations in the shuttles employed (such variations being inevitable) also produce the same result in the same way, since such variations vary the resistance which the shuttle encounters in boxing, a wide shuttle boxing harder than a narrow one, and a heavy shuttle having greater momentum than a light one. These variations in shuttles are important factors in the case of shuttle-changing looms. Change in the weather also materially affects the running of a loom, because shuttles are swelled by dampness. All of these modifying factors, however, as just stated, have the same effect in producing improper boxing as does irregular or ununiform picking. Irregular picking, to whatever cause it may be due, results in variation in the force of the blow which is delivered to the shuttle, and consequently the effect of varying speed of the loom upon the boxing of the shuttle is a substantially-true indication of what results from irregular or ununiform picking and variations in binder adjustment and in shuttles. I have for the purpose of determining the effect of varying speeds of the loom conducted an elaborate series of experiments, using self-registering devices on the loom to unmistakably indicate the result. As the result of such experimentation I find that the slower the loom runs the quicker relatively to the movement of the lay will the shuttle arrive at the shuttle-box, and that as the speed of the loom is increased the shuttle arrives relatively later and later. In all fast-running cotton-looms the shuttle is picked while the lay is moving backward—*i. e.*, away from the fell of the cloth—the picking movement com-

mencing ordinarily when the lay is about half-way back. The shuttle, therefore, makes its excursion across the lay while the lay is completing the rest of its backward movement and is again starting forward. When the loom is run slowly, the shuttle will arrive in the shuttle-box to which it is picked just after the lay has started forward, and as the speed of the loom is increased the lay will have moved farther and farther forward before the shuttle is boxed. These experiments demonstrate that, although as the speed of the loom increases both the lay and the shuttle travel faster and faster, the speed of the lay increases relatively faster than does the speed of the shuttle. I attribute this result largely to the circumstance that the lay is directly and positively driven, while the pickers are driven through loose connections, although other factors also apparenly act in the same direction. One feature of the present invention is based upon this investigation and consists in devices which automatically increase the binder-pressure during the shuttle-boxing period—that is to say, as the lay moves forward from its rear position. (I speak of the lay moving "forward" to indicate its movement toward the fell of the cloth.) Consequently the later-arriving shuttle, which has greater momentum, encounters greater resistance in entering the shuttle-box, and consequently is prevented from rebounding, while a slower but earlier arriving shuttle having less momentum encounters less resistance. In this way the binder-pressure is made to vary to correspond with the varying momenta of the shuttle, and consequently the shuttle is stopped uniformly in a substantially-definite place in the shuttle-box.

It is desirable that the pressure of the binder of each shuttle-box should be independently controllable, since the two boxes cannot be made or maintained exactly alike, and I therefore employ independent pressure-producers for both binders and vary the force of each pressure device independently. I accordingly do not utilize the spring which is used to operate the usual warp-protecting device carried by the lay to produce the desired varying pressure upon the binders. This enables me to employ a light spring on the warp-protector, which has simply to do its own proper work without reference to the shuttle-check. This light spring to be used on the warp-protector is of further advantage, since it permits the binder to respond quickly to the blow of the homing shuttle and the liability of unnecessarily "knocking off" the loom is avoided. I therefore have a warp-protector spring which exerts a substantially constant and uniform but light pressure on the shuttles when boxed, and the force of which is not varied by any device provided to check the shuttle, and in addition thereto have an independent pressure-producer for each binder, the force of which is varied in the manner already stated. This enables me to relieve the pressure on the binders due to the special pressure-producers at certain points in the cycle of the lay's operation for desirable purposes.

I especially design to use the present improvements in connection with a bobbin or cop changing loom similar to that shown in the Northrop Patent No. 529,940, dated November 27, 1894, (already referred to,) and in such looms it is desirable that the shuttle should be movable with comparative freedom in the shuttle-box when the transfer of a fresh bobbin or cop is made. In these bobbin or cop changing looms as now used the transfer is made when the lay is at or near the forward limit of its stroke. I accordingly relieve the shuttle-binders (particularly that at the feed end of the lay) from the pressure of the special pressure-producers just before the lay reaches the transferring position, so that when the transfer is made the shuttle is only under the slight pressure due to the warp-protector spring. This is important, since the shuttle is then readily susceptible of a slight endwise movement as the fresh bobbin or cop is being inserted, so that the shuttle can accommodate itself for the proper reception of the fresh bobbin. This is of especial advantage, since such looms are usually equipped with shuttles having bobbin or cop receiving jaws such as are shown in the Northrop United States Patent No. 454,811, dated June 23, 1891, which are adapted to receive bobbins or cops such as are shown in the same patent. This facility for movement of the shuttle during the transferring operation to accommodate itself to the bobbin or cop avoids breakage of bobbins while being inserted to a notable degree. The pressure due to the special-pressure producers being thus relieved for this purpose it is advantageous to leave them inactive during the back stroke of the lay and not to bring them again into action until the lay starts forward again. As a result, the only pressure on the binders during the picking is that due to the light warp-protector spring, so that an easy pick results. The warp-protector spring gives just enough pressure on the binders during the picking to insure the proper guiding of the shuttle during the pick. The present improvements as a whole therefore provide a spring unadjustable during the running of the loom, which gives a substantially constant and uniform but light pressure upon the shuttle when boxed and which also acts as a warp-protector spring, making the warp-protector sensitive and prompt; independent pressure-producers for the binders of both shuttle-boxes, which are out of action during the transfer of the bobbin or cop in a filling-changing loom employing a single shuttle and during the pick, so that the shuttle is freely movable endwise during the transfer, and there is a light pick, and these independent pressure-producers are brought into action after the lay starts for-

cordingly rocking the protector-rod and lifting the point of the dagger so that it clears the frog as the lay beats forward. In all of these respects the operation is the same as is usual.

Ordinarily the protector-rod spring 8 is made strong enough so as to apply shuttle-checking force to the binders. In accordance with the present improvements, however, the protector-spring is light, having just sufficient force to properly operate the protector-rod and the parts carried by it and to place a substantially constant and uniform but light pressure upon the shuttle when boxed. This pressure is only what is necessary to hold the binders in place against the wall of the shuttle, so that the shuttle will be properly guided when picked. By thus placing upon the spring only its protecting office it is rendered light and sensitive, so that it permits the shuttle when boxing to raise the dagger promptly and with certainty, thus preventing unnecessary "knocking off" and stopping of the loom. This is of especial importance, since when the loom runs very rapidly the homing shuttle arrives so late in the shuttle-box that where the tension of the protector-spring is utilized to check the shuttle the dagger often fails to be lifted in time to clear the frog, and consequently there is an unnecessary stoppage of the loom. By having a light protector-spring, however, the first encounter of the homing shuttle upon the binder as it enters the box suffices to throw the dagger clear up out of the way almost instantaneously. Preferably the warp-protector spring is secured in place so that its pressure cannot be varied by the loom-fixers, and there is no means on the loom for varying or adjusting it when the loom is running. It remains a constant factor.

The shuttle-checking pressure upon the binders is due to pressure-producers which are independent of the warp-protector spring and preferably independent of each other. As heretofore stated, each pressure-producer is brought into action just after the lay starts on its forward stroke and its force is gradually increased during the shuttle-boxing period. The force of the pressure-producer is withdrawn from the binder before the lay reaches the limit of its forward stroke, so that in case a change of bobbins is called the transfer is made with only the slight pressure of the warp-protector spring upon the shuttle at the feed or battery end of the lay, and the force of the pressure-producer remains off during the entire backward stroke of the lay, so that the pick is effected with only the slight protector-spring pressure on the shuttle. The mechanism effecting this action of the pressure-producers is the same at both ends of the loom, and hence a description of one mechanism will suffice for both.

The pressure-producer is preferably a coil-spring 9 (see Figs. 2 and 8) and is attached at one end to a finger 10, which is adapted and constructed to bear against the binder 3, and at its other end it is attached to a cam-follower 11. The cam-follower 11 is shown as a lever having a sleeve 12, (see Fig. 8,) which turns about a suitable stud 13, carried by the lay, this stud serving conveniently also as the pivot for the connection between the lay and the lay-pitman 14 (see Fig. 1) at that end of the lay. The checking-finger 10 turns conveniently upon said sleeve 12, and the pressure-producer or shuttle-checking spring 9 is coiled around the hubs of the finger 10 and cam-follower 11. The cam-follower 11 extends rearwardly, and at its rear end it carries a suitable stud or bowl 15, which coöperates with a suitable fixed cam 16, which imparts the desired variation in pressure to the shuttle-checking spring 9. When the lay is at its rearmost position, (see Fig. 4,) the cam-follower stud 15 rests upon a stationary shelf 17, against which it is held by the spring 9 back of and below the lowest point of the cam 16. When in this position, the checking-finger 10 does not come in contact at all with the binder, since it is held back out of the way by a stop 18 on the sleeve 12, (see Fig. 7,) which encounters it and holds it against the force of spring 9, and consequently there is then no pressure on the binder except that due to the light warp-protector spring. As the lay moves forward the cam-follower encounters and rides up the cam 16, thus rocking sleeve 12, moving stop 18 away from the checking-finger 10, and bringing said checking-finger to bear upon the binder and gradually increase the pressure, as shown in Fig. 5. It will be noted that the lifting of the cam-follower increases the tension of the shuttle-checking spring, and therefore gives an increasing pressure upon the binder until the highest point of the cam 16 is reached. The elevation of the cam-follower by the cam takes place during what I term the "shuttle-boxing" period of the lay's forward movement, because during this period the shuttle will always arrive in the shuttle-box within any probable range of speed of the shuttle which can occur. If the shuttle arrives as early as possible, it may reach the binder before the follower reaches the cam 16; but before the shuttle is entirely boxed the pressure of the shuttle-checking spring 9 is brought into play with sufficient force to prevent any detrimental rebound of the shuttle. As the shuttle arrives later in the box, it encounters greater and greater resistance, the cam 16 being so proportioned and of such shape that this pressure corresponds with the increasing momentum of the shuttle, and the cam is so arranged and shaped that the greatest pressure is applied at the very end of the boxing period—that is to say, at that period when the most tardily-arriving shuttle reaches the box. As a result the pressure on the shuttle corresponds with the momentum of the shuttle, and consequently it is stopped in substantially the same position irrespective of variable condi-

ward,and their effectiveness may be increased during the shuttle receiving or boxing period of the forward stroke of the lay, so that when the arriving shuttle travels quicker it meets with a greater resistance. The shuttle-receiving or shuttle-boxing period here referred to occurs during that portion of the forward stroke of the lay in which the homing shuttle may be received in the receiving-box, and during this period the force of the shuttle-checking-pressure producer is applied and increased.

In the ordinary binder and warp-protector arrangement when the shuttle enters the box the binder and warp-protector are suddenly actuated by the sharp quick blow due to the shuttle's entrance, and as a result are overthrown or moved beyond the position at which the binder contacts with the shuttle, so that the shuttle is substantially free from retarding friction for an appreciable period until the warp-protector spring recovers itself and restores the binder to its place, and this period gives opportunity for the shuttle to rebound before being checked. This opportunity for rebound is obviated by the present improvements, which separate the shuttle-checking-pressure producer from the warp-protector. In the present invention the binder in its outward overthrow under the impact of the entering shuttle meets the then-approaching pressure-producer, so that the outward movement of the binder is effectively checked while the motion of the warp-protector continues, and it is instantly restored into contact with the still entering shuttle, thus preventing any displacing rebound. The shuttle-checking-pressure producer, it will be noted, has only to overcome the inertia of the binder and not of the entire warp-protector, so that the outward throw of the binder is insufficient to appreciably modify the action of the pressure-producer.

While the present improvements have their greatest utility in automatic filling-changing looms, particularly those which insert fresh bobbins or cops in a single working shuttle, nevertheless they are useful in ordinary looms, since they obviate the trapping of the shuttle in the shed, due to irregular picking, to a very large degree, and they also obviate to a great extent the adjustment of the binders, otherwise rendered necessary by the employment of shuttles of varying widths and weights and by differences in the speeds of the loom.

For the purpose of illustrating the present improvements I have in the accompanying drawings shown them as applied to a filling-changing loom, where fresh bobbins or cops are automatically inserted into the working shuttle.

In the drawings, Figure 1 is a vertical cross-section of a portion of the loom, showing one of the pressure-producers. Fig. 2 is a plan view of one end of the loom. Fig. 3 shows the end of the loom opposite to that shown in Figs. 1 and 2 and shows a portion of the feed end of the loom. Fig. 4 is a diagram showing the position of one of the pressure-producers when the lay is all the way back. Fig. 5 is a similar diagram showing the lay part way forward. Fig. 6 is a similar diagram showing the lay all the way forward. Fig. 7 is a detail view of one of the pressure-producers, showing the opposite side of the parts to that shown in Figs. 4, 5, and 6. Fig. 8 is a longitudinal section through the axis of one of the pressure-producers. Fig. 9 is a plan view of the rear end of one of the pressure-producers and of the actuating-cam.

The illustrations only show sufficient of the loom to enable the present improvements and their relations to the other portions of the loom to be understood. The illustrated loom has the same general construction and mode of operation as the bobbin or cop changing loom of the Northrop patent, No. 529,940, (above referred to,) and includes the usual lay 1 and the usual rotary hopper or battery 2, (see Fig. 3,) containing a plurality of filled bobbins or cops, which are transferred one by one to the working shuttle when the filling in said shuttle requires replenishment. The mechanism for effecting this change is now so well known as to require no specific illustration or description beyond the statement that in such looms as now used the transfer takes place when the lay is at or near the limit of the forward movement.

The lay, as usual, has shuttle-boxes, one at each end, and the shuttle-boxes are or may be of the usual construction. Both shuttle-boxes are substantially alike, and hence reference to one suffices for both.

Each shuttle-box has, as usual, a binder 3, which is arranged to contact with the shuttle when in the box. In the drawings the binder is shown as a rear binder at the back of the shuttle-box, this being a common location for the binder.

Extending beneath the lay is the usual warp-protector rod 4, (see Fig. 1,) which constitutes part of the ordinary warp-protector mechanism. This protector-rod, as usual, rocks in suitable bearings carried by the lay and has the usual dagger 5, which coöperates in the usual manner with the frog 6 to effect the stoppage of the loom in the case of the trapping of the shuttle. Also, as is usual, the protector-rod has at or near each end an upwardly-projecting finger 7, which bears against the rear of one of the binders 3. The fingers 7 are kept against their corresponding binders by the usual spring 8, connected with the protector-rod 4 in the usual manner, so as to cause said rod to rotate in the direction which lowers the point of the dagger 5 to bring the same in line with the frog 6. When the shuttle fails to box, the dagger remains down, and consequently hits the frog and stops the loom. When, however, the shuttle is boxed, it presses back the binder, thus pressing back one of the fingers 7 and ac-

tions which may exist. The shuttle having been properly boxed and brought to a standstill at the determined position, the office of the pressure-producer or shuttle-checking spring has been completed and its pressure is no longer necessary. Accordingly the cam 16 terminates at its upper and forward end, so as to permit the cam-follower to pass in front and beyond it before the lay reaches its forward limit. As soon as the cam-follower thus passes beyond the cam the shuttle-checking spring throws the cam-follower down, thus taking the shuttle-checking pressure entirely from the binder, since the stop 18 encounters finger 10 and moves it back away from the binder, when the cam-follower drops down. Fig. 6 shows the position of the pressure-producer when the lay is at or near the forward limit of its motion. The downward throw of the cam-follower can be limited by any suitable stop, such as a projection 19 on the cam-follower encountering one of the lay-swords. (See Fig. 1.) Since the pressure is thus reduced before the lay reaches the limit of its forward stroke, it follows that if a transfer of bobbins is then made the shuttle will be free to be moved lengthwise within the shuttle-box at the battery end of the lay, thus facilitating the proper entrance of a fresh bobbin, this resulting in the avoidance of the breaking of bobbins and their misthreading. The cam-follower remains in its lowermost position, with the shuttle-checking spring out of action, during the entire back stroke of the lay, so that the shuttle is picked with only the light pressure on it due to the warp-protecting spring, which, as above stated, is only just sufficient to properly guide the shuttle during picking. During the back stroke of the lay the free end of the cam-follower preferably rides on the shelf or ledge 17, passing beneath the cam 16. The lower end 20 of the cam 16 is pivotally connected with the body of the cam and is held down by a spring 21. This spring, however, yields and allows the lower pivoted end of the cam to rise as the cam-follower stud 15 passes beneath it. Since the shuttle-checking springs are thus operated by cam-followers which are carried by the lay, the pressure-producers or shuttle-checking springs of both binders at opposite ends of the lay are operated at each reciprocation of the lay. Each binder, however, is operated only at every other reciprocation of the lay, and it is hence obvious that it would suffice if each shuttle-checking spring were operated only at every alternate reciprocation of the lay. It is convenient, however, to mount the cam-followers on the lay as a matter of construction. Hence this arrangement is shown.

This invention is not limited to the specific mechanism shown.

I claim as my invention—

1. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector, a spring the force of which is substantially constant upon the shuttle when boxed so that it is then subject to light pressure, a shuttle-checking-pressure producer, which is independent of the warp-protector, which coöperates with the binder during the shuttle-boxing period, and the force of which is increased during said period, and means for automatically varying the force of said pressure-producer, substantially as set forth.

2. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector having a spring the force of which is substantially constant upon the shuttle when boxed so that it is then subject to light pressure, a shuttle-checking-pressure producer which coöperates with the binder during the shuttle-boxing period and the force of which is increased during said period, and means for automatically varying the force of said pressure-producer, substantially as set forth.

3. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector, a spring which applies a substantially constant and uniform but light pressure on the shuttle when boxed, a shuttle-checking-pressure producer for said binder which is independent of the warp-protector, which is brought into action after the lay starts on its forward movement, the force of which is gradually increased during the boxing period of the lay's forward motion, and which is taken off during the picking period of the lay's backward motion, and means for automatically operating said pressure-producer to apply, gradually increase and take off its pressure, substantially as set forth.

4. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector having a spring which applies a substantially constant and uniform but light pressure on the shuttle when boxed, a shuttle-checking-pressure producer for said binder which is brought into action after the lay starts on its forward movement, the force of which is gradually increased during the boxing period of the lay's forward motion, and which is taken off during the picking period of the lay's backward motion, and means for automatically operating said pressure-producer to apply, gradually increase and take off its pressure, substantially as set forth.

5. A loom having, in combination, a lay, a shuttle-box, means for automatically inserting a fresh bobbin or cop in the shuttle, a binder, a shuttle-checking-pressure producer acting upon said binder to apply pressure to the shuttle, and means for automatically relieving said pressure on the binder while the fresh bobbin or cop is inserted, substantially as set forth.

6. A loom having, in combination, a lay, a shuttle-box, means for automatically inserting a fresh bobbin or cop in the shuttle when the lay is at or near the forward limit of its movement, a binder, a shuttle-checking-pressure producer acting upon said binder to apply pressure to the shuttle, and means for au-

tomatically relieving said pressure on the binder during the forward stroke of the lay and before the lay reaches the position where the fresh bobbin or cop is inserted, substantially as set forth.

7. A loom having, in combination, a lay, a shuttle-box, a binder, means for automatically inserting a fresh bobbin or cop in the working shuttle when the lay is at or near the forward limit of its movement, a warp-protector having a spring which applies a substantially constant and uniform but light pressure to the shuttle, an independent shuttle-checking-pressure producer also acting on said binder, and in such a manner as to apply a gradually-increasing pressure during the boxing period of the lay's forward movement and to be taken off before the lay is at its position where the insertion of the bobbin or cop is effected, and to remain off during the picking period of the lay's backward stroke, and means for automatically operating said pressure-producer to apply, gradually increase and take off its pressure, substantially as set forth.

8. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector which is actuated when the shuttle enters the box, a shuttle-checking-pressure producer independent of the warp-protector which is actuated to apply pressure to the binder after the lay has started on its forward stroke, and means for automatically actuating said pressure-producer, substantially as set forth.

9. A loom having, in combination, a lay, a shuttle-box, a binder, a warp-protector which is actuated when the shuttle enters the box, a shuttle-checking-pressure producer independent of the warp-protector the force of which is increased during the shuttle-boxing period, and means for automatically increasing the force of said pressure-producer, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM F. DRAPER.

Witnesses:
E. D. BANCROFT,
ARTHUR S. BROWNE.