No. 820,661. PATENTED MAY 15, 1906.

F. A. MILLS.

SHUTTLE CHECK AND LOCK FOR LOOMS.

APPLICATION FILED NOV. 6, 1903.

3 SHEETS—SHEET 1.

Fig. 1.

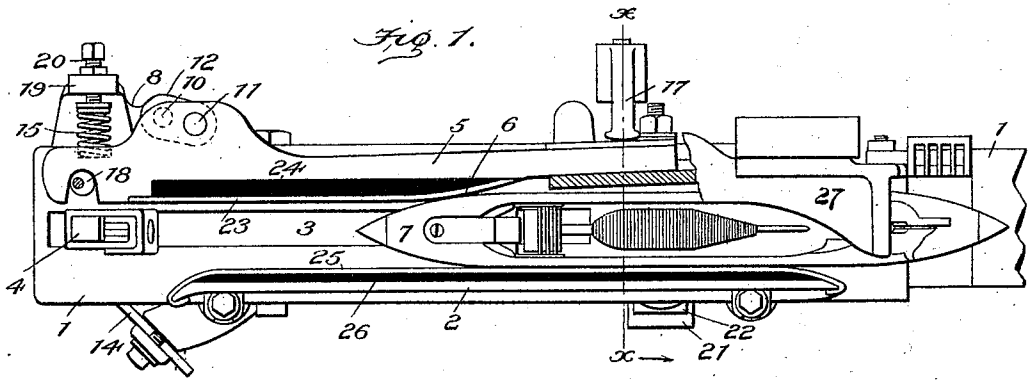


Fig. 2.

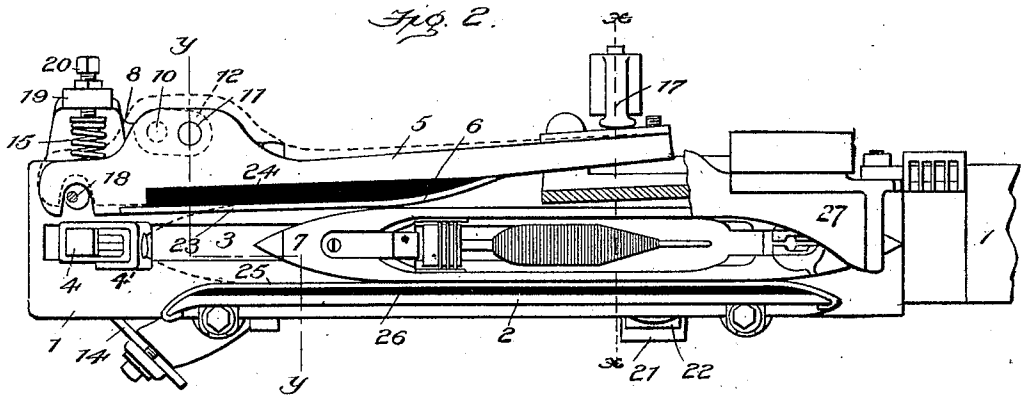
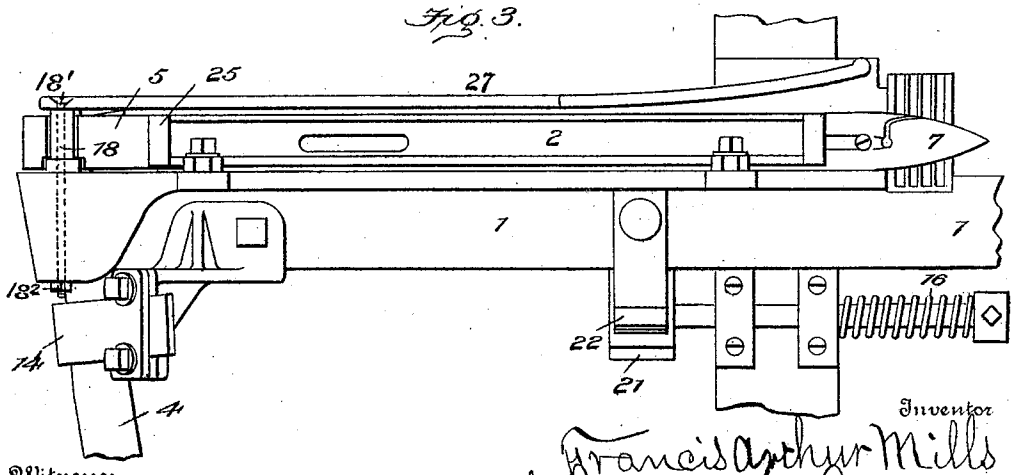


Fig. 3.



Witnesses

Edwin L. Bradford

Thomas Ard Yeager

Inventor

Francis Arthur Mills

By Johnson & Johnson

Attorneys

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3 SHEETS—SHEET 2.

Fig. 4.

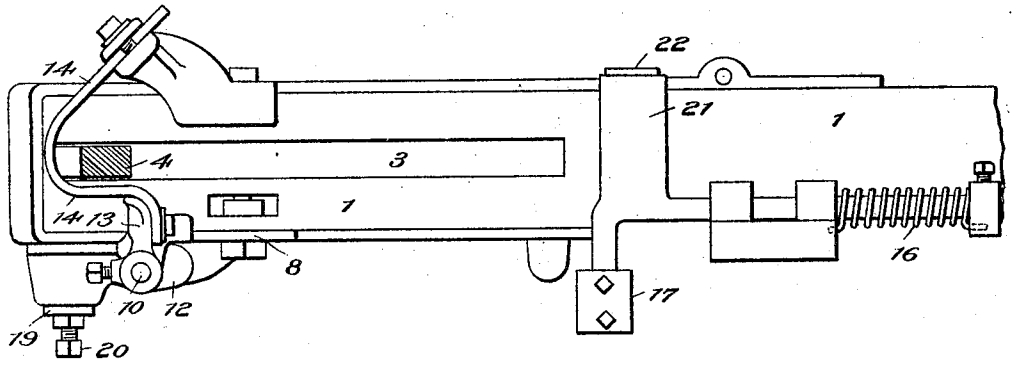


Fig. 5.

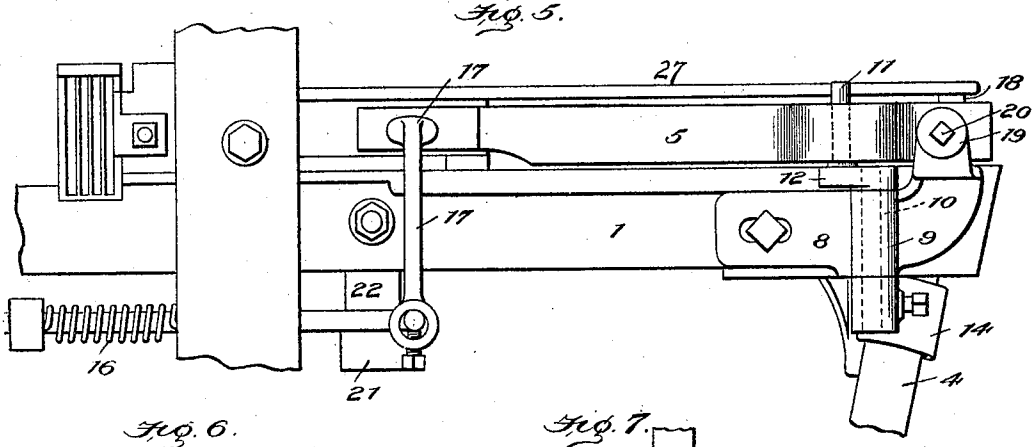


Fig. 6.

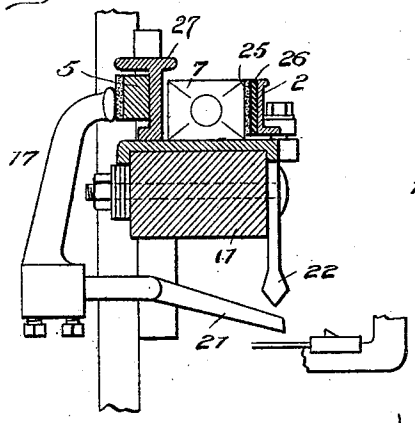
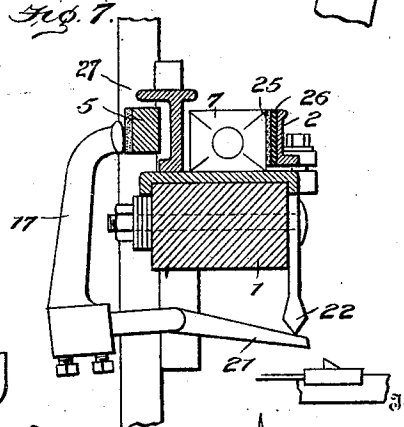


Fig. 7.



Witnesses

Edwin L. Bradford

Thomas Hood Yeager.

Inventor

By Francis Arthur Mills

Johnson & Johnson

Attorneys

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3 SHEETS—SHEET 3.

Fig. 8.

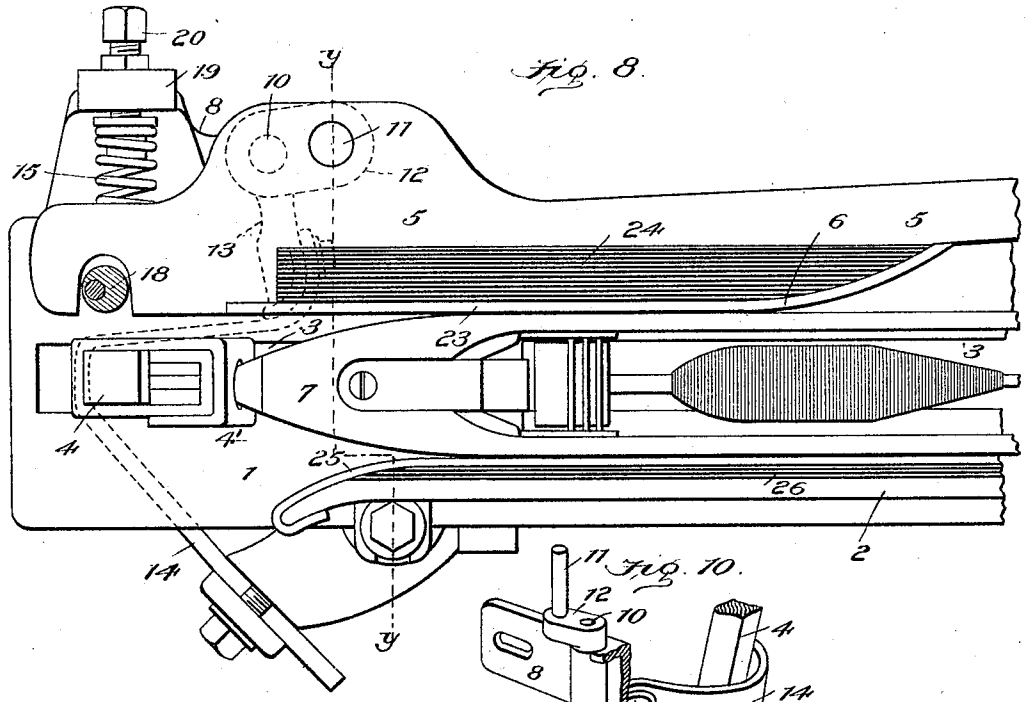


Fig. 10.

Fig. 9.

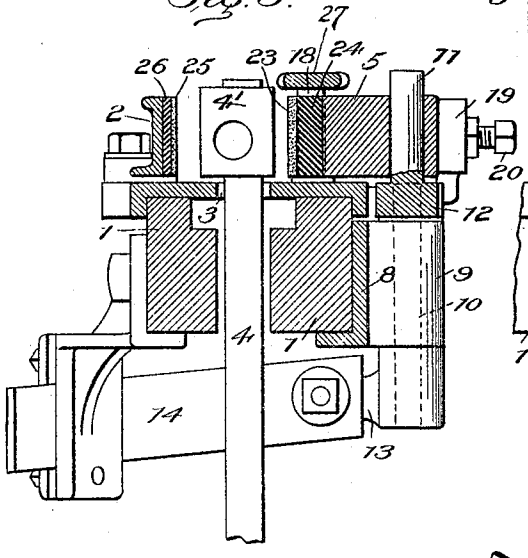
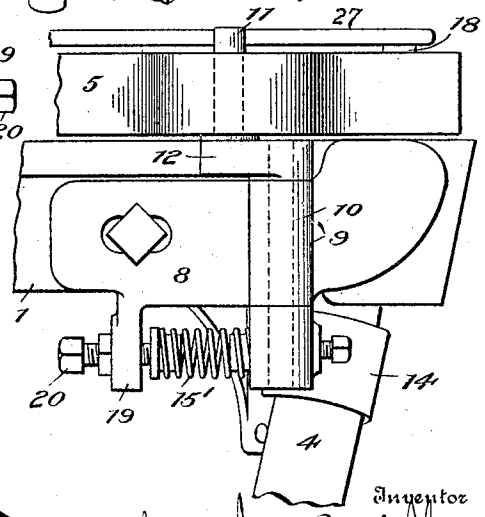


Fig. 11.



Witnesses

Edwin L. Bradford

Thomas Ard Yeager

Inventor

Francis Arthur Mills

By Johnson & Johnson

Attorneys

ANDREW, B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANCIS ARTHUR MILLS, OF LAWRENCE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO GROSVENOR B. EMMONS, OF METHUEN, MASSACHUSETTS.

SHUTTLE CHECK AND LOCK FOR LOOMS.

No. 820,661. Specification of Letters Patent. Patented May 15, 1906.

Application filed November 6, 1903. Serial No. 180,121.

To all whom it may concern:

Be it known that I, FRANCIS ARTHUR MILLS, a citizen of the United States of America, residing at the city of Lawrence, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Shuttle Checks and Locks for Looms, of which the following is a specification.

The invention which is the subject of this patent has for its object the gradual checking of the shuttle from the time it strikes the swell of the shuttle-binder to the limit of its throw in the shuttle-box, and at which point the shuttle is stopped and locked in a predetermined position in the shuttle-box.

The following description, read in connection with the accompanying drawings, will enable any one skilled in the art of shuttle checking and locking mechanism for looms to understand my invention and to practice it in the form in which I prefer to employ it; but it will be understood that my invention is not limited to the precise form and details of construction herein illustrated and described, as various modifications and changes may be made without exceeding the scope of my invention.

So far as I know and can find I am the first to employ means in a loom for causing a shuttle-binder pivotally mounted on the lay to be spring-pressed inwardly toward the picker-stick slot or opposite side of the shuttle-box throughout the entire binder, including its pivot, and free to be moved outwardly against spring-pressure at every point by the ingoing shuttle for the gradual checking and stopping of the shuttle and for locking it in the box at the end of its flight in a predetermined position. I also believe myself to be the first to cause a shuttle-binder laterally movable at its outer end to apply a gradually-increasing spring-pressure upon the shuttle during the time the shuttle comes in contact with the binder to the limit of its travel in the shuttle-box. I also believe myself to be the first to yieldingly check and lock a shuttle in a shuttle-box by yieldingly pressing upon said shuttle by and under the impact of said shuttle upon the picker of the picking mechanism.

Referring to the drawings, Figure 1 represents in top view the left end of the lay and the shuttle-box of a loom embracing one form of my invention, the shuttle being shown as having entered the box to the position having just come in contact with the shuttle-binder. Fig. 2 is a similar view showing the position of the shuttle as having forced the binder outward to operate the dagger, so that the protector will clear the frog. In this view the dotted lines show the shuttle as having reached the limit of its throw in the box and in contact with the picker and the binder and its fulcrum in the positions they will be moved, caused by the shuttle having moved from the position shown in full lines to the position shown in dotted lines, at which point the shuttle is locked. Fig. 3 is a front elevation of the same end of the lay and in which is seen the dagger, its spring, and the adjustable stop for limiting the upward throw of the dagger. Fig. 4 shows a bottom view of the same end of the lay, the strap connections for the shuttle checking and locking mechanism, and the dagger device. Fig. 5 shows a rear view of the same end of the lay, illustrating the shuttle checking and locking lever device which forms the laterally-movable fulcrum of the shuttle-binder and also showing the protection-finger and its fulcrum bearing relation to the end of the shuttle-binder. Fig. 6 is a transverse section on the line x x of Figs. 1 and 2, showing the protecting-finger and its frog in the positions they occupy before the shuttle actuates the shuttle-binder. Fig. 7 is an identical section showing the dagger having been lifted to the stop to clear the frog when the shuttle and its binder are in the positions shown in Fig. 2. Fig. 8 shows in top view, enlarged, the shuttle in contact with the picker 4′ and having operated the fulcrumed end of the shuttle-binder and the lever device for checking and locking the shuttle, as shown in dotted lines in Fig. 2. Fig. 9 shows a transverse section of the same on the line y y of Figs. 2 and 8. Fig. 10 shows in perspective the lever checking and locking device having the fulcrum-pin for the shuttle-binder and the lever and strap connection for checking and locking the shuttle. Fig. 11 is a view showing a modified arrangement of the spring beneath the lay for causing the shuttle-binder to be pressed inward at its fulcrumed end toward the opposite wall

of the shuttle-box, the spring being shown as pressing upon the strap-lever of the lever device and for yieldingly checking and locking the shuttle by the impact of the shuttle upon a strap connection.

The lay 1, having a shuttle-box 2 thereon, and the slot 3 for the picker-stick 4 are of the usual construction. The shuttle-binder 5 is formed with the swell 6 for contact with the shuttle 7 and is pivotally fulcrumed on a lever checking and locking device, which, with the binder, has a movement toward and from the picker-stick slot or opposite side of the shuttle-box. This lever checking and locking device is preferably mounted at the end of the lay on a plate 8 adjustably bolted to it and having a bearing 9 for a shaft 10, which has a lever 12 connected to it at its upper end, and this lever has a pivot-pin 11, which forms the fulcrum for the shuttle-binder. The other end of the shaft has a lever 13, to which is connected the adjustable means for receiving the impact of the shuttle upon the picker to operate the means for checking and locking the shuttle at any desired position in the shuttle-box. For causing the shuttle-binder and its fulcrum to be forced inward toward the shuttle or opposite side of the shuttle-box I employ spring-pressure to cause the binder to be pressed at both ends toward and against the shuttle to check it. It is therefore by the protection-finger 17 acting as a fulcrum, as in Fig. 7, to one end of the binder while the primary fulcrum and the other end of the binder are being forced out against the tension of the binder-spring 15 by the ingoing shuttle that the shuttle is being gradually stopped from the time it strikes the swell of the binder until it reaches the limit of its travel in the box and is locked. The secondary bearing-fulcrum formed by the protection-finger constitutes in its coöperating function with the primary fulcrum for the shuttle-binder, and in which the latter is spring-pressed inward at every point of its entirety, one of the features of my invention. As means for limiting the inward movement of the shuttle-binder under the action of the spring 15 when the shuttle is out of the box I employ an eccentric stop 18, which may be adjusted to allow more or less inward movement to the primary fulcrumed end of the shuttle-binder and to limit the inward movement of the latter under the pressure of the spring 15 when the shuttle is out of the box. The means provided for this adjustment of the eccentric stop is a long screw-bolt 18′, passing through the cap-plate 27, through a bore in the eccentric, and down through a hole in the end of the lay and secured on the under side thereof by a clamp-nut 18^2, as shown by dotted lines in Fig. 3, so that by loosening the nut leaves the eccentric free to be turned on the screw to allow the eccentric part to be set farther inward or outward and then fastened by the clamp-nut to the top of the lay to form the stop against which the binder is pressed when the shuttle is out of the box.

Whlie I have shown a strap as the means of receiving and communicating the force of the impact of the shuttle upon the picker or picker-stick, I do not wish to be confined to an impact-strap connected to a lever device, as equivalent means may be used to receive and transmit the force caused by the shuttle's impact on the picker or picker-stick; but I prefer to use an adjustable strap connection, as in my patent of August 5, 1902, No. 706,190, as being effective for causing the shuttle to be checked, stopped, and locked at a predetermined point in the shuttle-box to receive a bobbin of filling from a magazine to the shuttle, as in the patent to J. H. Northrop of November 27, 1894, No. 259,940.

My invention comprehends a new conception and operation in checking, stopping, and locking the shuttle, which is as follows: The shuttle having been picked across the lay through the shed enters the shuttle-box, coming in contact with the swell of the shuttle-binder, as seen in Fig. 1; continuing its movement presses the binder and the protection-finger out against the pressure of the protector-spring 16 until the dagger 21 reaches an adjustable stop 22, as shown in Figs. 2 and 7, the dagger being thereby lifted to clear the frog. At this stop the outward movement of the protector-finger and end of the binder ceases, and then the protector-finger 17 becomes the bearing-fulcrum for the long end or arm of the binder. The shuttle continuing its inward movement to the position shown in Fig. 8 and in dotted lines in Fig. 2 forces the outer end of the binder and its primary fulcrum out against the pressure of the binder-spring 15 to the position shown in Fig. 8 and in Fig. 2 in dotted lines from the position shown in Fig. 2 in full lines, and during this time the shuttle is traveling from the position in Fig. 2 in full lines to that shown in dotted lines the protection-finger becomes the secondary fulcrum for the shuttle-binder. While the shuttle is traveling from the position shown in Fig. 2 in full lines to that shown in the same figure in dotted lines and in Fig. 8 in full lines the binder and its primary fulcrum are moved outward against spring-pressure to gradually check and stop and lock the shuttle. The shuttle having delivered its impact upon the picker, the picker-stick causes the strap to pull upon the lever device, and the latter causes the binder to be pressed upon the shuttle to check and lock it. From the time the shuttle strikes the swell of the binder the latter will be free to be moved outward at every point away from the opposite side of the shuttle-box against spring-pressure to the full extent of the movement of the shuttle into the box. For operating the fulcrumed end of the binder by spring-

pressure toward the picker-stick slot or opposite side of the shuttle-box I have shown a spring 15 pressing against the short arm of the binder, so that the laterally-movable fulcrum will be between the spring and the protection-finger. In Figs. 1, 2, and 8 this spring is shown as adjustably connected to cause it to give more or less pressure upon the primary fulcrum and short arm of the shuttle-binder. The plate which supports the lever device may also provide a support 19, having a screw 20 for causing the spring to give more or less pressure to the short arm or outer part of the binder and its fulcrum-pin inward toward the opposite side of the shuttle-box, a lock-nut for the screw-bolt being employed to maintain the adjustment. In Fig. 11 the spring 15′ is shown as supported by a bracket under the lay and as pressing upon the strap-lever 13, causing the shaft to be rocked to communicate the pressure to the primary lever-fulcrum and outer end of the binder. The protection-finger bears upon the long arm of the binder under spring-pressure, so that when the shuttle enters the box and comes in contact with the swell of the binder the latter will be caused to be pushed out, thereby pushing out the protection-finger, causes the lifting of the dagger to clear the frog. The dagger will thereby be brought in contact with the adjustable stop, and this stop will prevent the further outward movement of the protection-finger, which is in contact with the binder, and at this point the protection-finger becomes a bearing-fulcrum on which the primary pivoted end of the binder is moved outward by the ingoing shuttle under spring resistance. Among others, the features of novelty in this operation are the pressing of the shuttle-binder by its swinging fulcrum inwardly throughout its entirety by spring-pressure toward the opposite side of the shuttle-box and moving it outwardly throughout its entirety by the incoming shuttle against spring-pressure; the binder being spring-pressed inwardly at both ends to check the shuttle; moving the binder inwardly at both ends, together with its fulcrum, by spring-pressure; forcing the fulcrum-lever of the binder inwardly by the same spring-pressure which forces the binder inward; operating the shuttle-binder upon a primary fulcrum at its short end and against a secondary fulcrum at its long inner end to gradually check and stop the shuttle; causing the protector-finger to form an inwardly-pressed bearing-fulcrum for the inner end of the binder when the primary fulcrum and the outer end of the binder are being moved outward by the incoming shuttle at the point of locking it, the binder for this purpose having a slight oscillating movement upon its primary fulcrum, because the primary fulcrum of the binder is between its spring-pressed short end and the secondary fulcrum formed by the protection-finger, so that in the outward flight of the shuttle the oscillating movement of the binder will be reversed, while in the locking of the shuttle the spring maintains an inward pressure upon the binder and upon its fulcrum, moving them both inward, while both are free to yield in a direction opposite to the spring-pressure by the ingoing shuttle.

Looking at Figs. 1, 2, 8, and 9 will be seen a facing 23 on the contact side of the shuttle-binder, and between it and the binder will be seen a rubber cushion 24, held in place by cement or other means to the leather facing and the binder, and the function of this cushion is to yield under the locking action of the binder on the shuttle caused by the action of the lever device pressing upon the binder, thereby rendering the checking and locking of the shuttle by the binder and lever device more effective and which avoids any injury to the shuttle from undue pressure because of the shell character of the shuttle. Adjuvant to the function of the cushion on the contact-wall of the binder I employ a facing 25 on the fixed wall of the shuttle-box, and between this facing and the wall of the box is a cushion 26, (rubber, for instance,) so that the shuttle entering the box to the limit of its travel in the box will be cushioned on both its binder and shuttle-wall sides, whereby the shuttle is cushioned on both sides throughout its travel in and out of the box, and it will also be understood that the said rubber serves to cause a spring action to the lever of the lever device and the impact-strap connected to said lever and the lay, so that when the shuttle strikes the picker and the picker-stick is driven against the said strap the shuttle will be yieldingly checked and locked under spring resistance.

Referring to Fig. 11, which is a modification showing the spring 15′ as located beneath the lay, it will be seen that the spring operates upon the strap-connected lever-arm 13 of the lever device (seen in Fig. 4) and that the pressure upon this strap lever-arm is such as to transfer the spring-pressure to the primary fulcrum upon which the binder is fulcrumed, which causes the binder and its fulcrum to be pressed toward the opposite wall of the shuttle-box. In this function of the spring its tension is adjusted by the screw-bolt 20 in a depending lug 19 to give more or less pressure upon the binder and its primary fulcrum. The shuttle-box is provided with the usual cap-plate 27 for the shuttle-binder.

It is important to note that the laterally-movable fulcrum 11 is located so as to give the binder a long and a short arm or end and that the binder being spring-pressed on each side of its fulcrum causes it to oscillate on its fulcrum by the action of the lever 12 on the fulcrum-pin and the contact of the shuttle

with the binder. In this oscillation of the binder its short end or arm has a movement inward and is also spring-pressed inward, thereby causing the shuttle to be under pressure throughout the length of the binder, with an increasing force toward and at the short end or arm of the binder.

It is important to note that while the shuttle-binder is caused to be forced inward against the shuttle by the impact of the shuttle against the picker and the impact of the picker-stick against the impact-strap the transmission of the force of such impact upon the binder will cause the free swinging inward movement of its fulcrum-pin in the arc of a circle and the consequent inward oscillation of the binder in its action on the shuttle. The free swinging action imparted to the lever 13 by the impact-strap gives a free swinging action to the binder and its swinging fulcrum inward, while the outgoing flight of the shuttle allows a free swinging action inward to the binder and its swinging fulcrum caused by the spring 15. It will also be noted that the oscillation of the shuttle-binder upon its fulcrum-pivot allows it to yield under pressure solely in a horizontal plane inward and outward in its relation to the movements of the shuttle and that such movements are upon a fulcrum firmly mounted upon the lay in order to render the shuttle-lock effective. It will also be noted (looking at Fig. 10 of the drawings) that the lever device for locking the shuttle-binder consists of a single part of four elements, each element having a separate and distinct function in the operation of effecting such lock. Of these elements the vertical shaft 10 is the support and carrier and has a rocking movement in its bearing to impart to the lever 12, fixed on its upper end, a lateral movement in the arc of a circle, and which in such movement carries the pivot-pin 11, which by its function gives the lateral movement to the shuttle-binder, while the lever 13 on the lower end of the shaft in its function transmits the impact of the strap to the shaft, and thence to the lever 12, to laterally move the pivot-pin, each element having a fixed relation to the other.

I claim—

1. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder pivotally mounted on the lay, means for causing it to be yieldingly pressed inwardly toward the opposite side of the shuttle-box throughout its entirety, for the purpose stated.

2. In a loom, the lay, a shuttle-box, a binder pivotally mounted on the lay, spring-pressed throughout its entirety toward the opposite wall of the shuttle-box and free to be moved outwardly by the ingoing shuttle throughout its entirety against spring-pressure, for the purpose stated.

3. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a pivotally-mounted shuttle-binder, and means for causing the binder including its pivot to be spring-pressed inwardly and movable laterally.

4. In a loom, the lay, the shuttle-box, the shuttle-picking mechanism therefor, a shuttle-binder pivotally mounted on the lay, and means for causing the shuttle-binder to be spring-pressed inwardly and movable laterally at both its ends, for the purpose stated.

5. In a loom, the lay, a shuttle-box, the shuttle, picking mechanism therefor, an inwardly-spring-pressed shuttle-binder and fulcrum therefor, and means for adjusting the degree of pressure of the binder and its fulcrum, for the purpose stated.

6. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder, means for causing it to be yieldingly pressed inwardly throughout its entirety to gradually check and stop the shuttle, in combination with means for locking the shuttle.

7. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder spring-pressed inwardly throughout its entirety toward the opposite wall of the box and having a movable fulcrum at both ends.

8. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable and spring-pressed inwardly throughout its entirety toward the opposite wall of the shuttle-box and having an inwardly-spring-pressed fulcrum at each end, means for adjusting the degree of pressure inwardly upon the binder and its primary or pivot fulcrum.

9. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable and spring-pressed inwardly throughout its entirety toward the opposite side of the shuttle-box and having an inwardly-spring-pressed movable fulcrum at each end, the protector-finger forming the bearing-fulcrum for the binder when the binder and its primary or pivot fulcrum are being moved outward against spring-pressure by the ingoing shuttle.

10. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable and spring-pressed throughout its entirety toward the opposite side of the shuttle-box, a lever device for locking the binder upon the shuttle having a pivot forming the fulcrum for the binder.

11. In a loom, and in combination, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder, a movable pivot-fulcrum therefor, a spring maintaining an inward pressure upon the binder and its movable pivot-fulcrum toward the opposite side of the shuttle-box, the binder and its fulcrum adapted to yield in a direction oppo-

site to the pressure of the spring by the ingoing shuttle.

12. In a loom, a lay having shuttle-box and a laterally-movable binder, a laterally-movable fulcrum for the binder mounted on the lay and a spring at the fulcrumed end of the binder constantly pressing the latter and its fulcrum inward toward the opposite side of the shuttle-box, the lever carrying the fulcrum, having means actuated by the impact of the shuttle to cause the said lever and its fulcrum to force the binder against the shuttle.

13. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder movable and spring-pressed inwardly at both ends, and mounted between its spring-pressed ends upon a fulcrumed lever movable inward and outward.

14. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder including a spring for pressing the shuttle-binder inward, an adjustable eccentric stop for limiting the inward movement of the binder, a lever device upon which the shuttle-binder is mounted and movable with it, and an adjustable impact-strap connected to said lever device.

15. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder, a lever device consisting of a shaft, a lever on the upper end thereof having a fulcrum-pin on which the binder is mounted, a lever on the lower end of the shaft, an adjustable impact-strap connected to said lower lever, and springs arranged to press the binder and its connected lever inward throughout the entirety of the binder for the purpose stated.

16. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder including a spring for pressing and moving its outer end inward, the protection-finger and a spring for pressing and moving it inward upon the other end of the shuttle-binder, and a lever device on which the shuttle-binder is pivotally mounted and an adjustable impact-strap connected to said lever device.

17. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder including means for causing it to be movable and spring-pressed inwardly throughout its entirety and free to be moved outwardly against spring-pressure at every point, including a fulcrum movable with the shuttle-binder.

18. In a loom, the lay having a shuttle-box, the shuttle and picking mechanism for the shuttle, an inwardly-spring-pressed shuttle-binder an adjustable impact-strap and a lever device adapted to control the inward movement of the binder and its fulcrum for the purpose stated.

19. In a loom, the lay, its shuttle-box, the shuttle and picking mechanism therefor, a movable shuttle-binder having a facing on its contact side and a cushion or yielding substance between the facing and the movable binder throughout the contact-face thereof, and the protection mechanism operated by the latter, for the purpose stated.

20. In a loom, the lay, the shuttle-box, the shuttle, and picking mechanism therefor, said shuttle-box wall having a facing on its contact side, and a cushion or yielding means located between said facing and said box-wall throughout the entire contact length of said box-wall.

21. In a loom and in combination, the lay having a shuttle-box, the shuttle and picking mechanism for the shuttle, a shuttle-binder, including a movable fulcrum therefor and a spring for pressing and moving the binder and its fulcrum inward, means governed by the impact of the shuttle to actuate the binder-fulcrum and an adjustable stop to limit the inward movement of the binder when the shuttle is out of the box.

22. In a loom, a lay having a shuttle-box wall, an opposite laterally-movable binder, a shaft having a lever on its upper end provided with a pin which forms a laterally-movable fulcrum for the binder, a spring on the lay pressing the outer end of the binder inward, a lever on the lower end of the shaft standing inward, and an adjustable impact-strap connected to said lever the lever having the fulcrum-pin standing toward the inner end of the binder and in advance of the strap-connected lever.

23. In a loom, and in combination, the lay, a shuttle-box, the shuttle and picking mechanism therefor, the shuttle-binder, the spring-pressed protection-finger forming a fulcrum for the inner end of the binder, a spring pressing the outer end of the binder inward, a lever having a fulcrum-pin for the binder between the spring and the protection-finger whereby the entire binder is free to be moved outward against spring-pressure by the ingoing shuttle and inward by spring-pressure by the outgoing shuttle to cause the entire binder to have an outward and an inward movement, and an adjustable impact-strap to force the fulcrum laterally inward and the binder against the shuttle to lock it.

24. In a loom, a lay having a shuttle-box, a shuttle-binder and a fulcrum-lever for and laterally movable with the binder and causing the binder to have an outer short end and an inner long end and a spring constantly pressing and moving the short end toward the opposite wall of the shuttle-box.

25. In a loom, a lay, a shuttle-box, the shuttle-picking mechanism therefor, a shuttle-binder pivotally mounted on the lay means causing it to be pressed inward while being forced outward by the ingoing shuttle

throughout the entire binder including its swinging pivot the same means causing the binder to be pressed to its normal position as the shuttle is being thrown out of the box.

26. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder spring-pressed inwardly and movable from and toward the opposite side of the shuttle-box throughout the entire binder, and protection mechanism operated thereby, and means for causing the shuttle-binder to be yieldingly pressed inwardly throughout its entirety, for the purpose stated.

27. In a loom, the lay, having a shuttle-box, the shuttle and picking mechanism for the shuttle, a pivoted shuttle-binder having an unyielding facing on its contact side and a yielding material between the facing and the shuttle-binder, and protection mechanism actuated by the pivoted binder.

28. In combination in a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder, a fulcrum therefor adapted to have a free swinging movement and dividing the binder in a short and a long arm, and means for causing the shuttle-binder to be spring-pressed inwardly and movable at both ends with an increasing spring force upon the ingoing shuttle at the short arm or outer end of the binder.

29. In a loom, the lay and the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder laterally movable at its outer end and means for causing said binder to apply a continually gradually increasing spring-pressure upon the shuttle from the time the shuttle strikes the binder until it reaches the limit of its travel in the shuttle-box.

30. In a loom, and in combination, the lay, the shuttle-box, a binder having a long and a short arm, and a laterally-movable fulcrum for the binder independent of the protection-finger near its short arm and spring-pressed inward at its short arm.

31. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety including its pivot or fulcrum and means to cause said binder to apply a gradually-increasing inward pressure upon the shuttle from the time the shuttle strikes the binder to the limit of its travel in the box.

32. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder laterally movable at its outer end having means for causing said binder to apply a continually-increasing inward pressure upon the shuttle during its travel in the box in contact with said binder and thereby stop the same.

33. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder forming a side of the shuttle-box and laterally movable at its outer end, and means operated by the ingoing shuttle to thereby stop the same to apply an inwardly-increasing pressure of the binder upon the shuttle throughout the length of the binder and a gradually-decreasing pressure upon the outgoing shuttle throughout the length of said binder.

34. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a laterally-movable and inwardly spring-pressed shuttle-binder having three fulcrums or pivots, one stationary at the outer end of the lay, one spring-pressed inwardly and movable with the inner end of the binder, and one located between the two laterally movable and spring pressed inwardly with the binder toward the opposite side of the shuttle-box.

35. In a loom, the lay, a shuttle-box, the shuttle and picking mechanism therefor, a pivoted laterally-movable shuttle-binder and also its fulcrum or pivot spring-pressed inwardly upon the shuttle near the outer end when at the limit of its travel in the box.

36. In a loom and in combination the lay, the shuttle-box the shuttle and picking mechanism therefor, a shuttle-binder forming a side of the shuttle-box and having connection to operate the protection device at or near the inner end of the binder, and means at the outer end of the shuttle-box to cause said binder to be yieldingly pressed inwardly at its outer end for the purpose stated.

37. In a loom, a lay, the shuttle-box, a shuttle and picking mechanism therefor, a shuttle-binder forming the side of the shuttle-box and laterally movable at its outer end, and means coacting with said binder to cause the latter to gradually and increasingly resist and reduce the speed of the shuttle until it stops in the shuttle-box.

38. In a loom, the lay, the shuttle-box, the shuttle, picking mechanism therefor, and a shuttle-lock, the said shuttle-box having yielding means coacting upon said shuttle throughout the contact length of said shuttle-box.

39. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, an inwardly spring-pressed shuttle-binder having three pivots or fulcrums, one at the outer end of the binder, one at the inner end of said binder and one located between the two yieldingly pressed inward with the binder for the purpose stated.

40. In a loom, the lay, the shuttle-box, the shuttle, picking mechanism therefor, and means for causing a yielding pressure upon said shuttle operated by the impact of said shuttle upon the picker of said picking mechanism for yieldingly checking and locking said shuttle.

41. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a

shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, said binder having a facing on its contact side and a cushion or yielding means between said facing and said binder.

42. In a loom, the lay, the shuttle-box, the shuttle, picking mechanism therefor, a shuttle-lock, and a binder having a cushioning means coacting upon the shuttle throughout the contact length of said binder.

43. In a loom, the lay, the shuttle-box having a shuttle-binder, the shuttle and picking mechanism therefor, said shuttle-binder and said shuttle-box, each having a yielding material coacting upon the shuttle, in combination with means for locking the shuttle by the impact of said shuttle upon the picker.

44. In a loom, the lay, the shuttle-box, the shuttle, and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, including its pivot or fulcrum, said shuttle-binder and said shuttle-box, each having a yielding means to coact upon the shuttle in combination with means for locking the shuttle by the impact of said shuttle.

45. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder spring-pressed inwardly at or near its outer end, movable laterally throughout its entirety, said binder caused to be moved outwardly at its outer end by the ingoing shuttle, in combination with means for yieldingly pressing the outer end of said binder inwardly upon said shuttle to lock it.

46. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, and means for causing said binder to apply a gradually-increasing pressure upon the ingoing shuttle from the time the shuttle strikes the binder to the limit of its travel in the box, said binder having a yielding means coacting upon the shuttle and said shuttle-box having a cushioning means coacting upon the shuttle.

47. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, and means for causing said binder to apply a gradually-increasing pressure upon the shuttle from the time the shuttle strikes the binder.

48. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, and means for causing said binder to apply a gradually-increasing pressure upon the shuttle from the time the shuttle strikes the binder to the limit of its travel in the box, said binder having a yielding means coacting upon the shuttle throughout its contact length.

49. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder pivotally mounted on the lay and having a yielding or cushioning means for the shuttle, in combination with means for pressing said binder upon said shuttle by the impact of the shuttle upon the picker.

50. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder pivotally mounted on the lay, having a yielding or cushioning means and an opposite shuttle-box wall having coacting yielding means in combination with means for yieldingly pressing said binder upon the shuttle and the shuttle upon said opposite wall by the impact of said shuttle.

51. In a loom, the lay, the shuttle-box, a shuttle-binder, the shuttle and picking mechanism therefor, a lever device to force the binder against the shuttle, said binder having yielding means at or near its outer end to yield upon the shuttle by the impact of the shuttle upon said lever device.

52. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder having means to yield upon said shuttle in combination with means to force said binder upon said shuttle by the impact of the shuttle upon the picker.

53. In a loom, the lay, the shuttle-box, the shuttle-picking mechanism therefor, a shuttle-binder and means for causing it to be yieldingly pressed upon said shuttle by the impact of said shuttle upon the picker to yieldingly lock said shuttle at the end of its flight in said shuttle-box.

54. In a loom, the lay, the shuttle-box, the shuttle-picking mechanism therefor, a shuttle-binder and means operated by the impact of the shuttle for causing said binder to be yieldingly pressed upon the shuttle, and the box-wall having a yielding face against which the shuttle is yieldingly pressed by the impact of the shuttle upon the picker.

55. In a loom, the lay, the shuttle-box having a shuttle-binder, the shuttle and picking mechanism therefor, a shuttle check or lock having yielding means located between the contact-face of the picker and the contact-face of said binder to cause said binder to be yieldingly pressed upon said shuttle by the impact of said shuttle upon said picker.

56. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder including its pivot or fulcrum movable from and toward the opposite side of the shuttle-box throughout its entirety, said binder having a facing on its contact side and a yielding means located between said facing and said binder throughout its contact length to coact upon said shuttle.

57. In a loom, the lay, the shuttle-box hav-

ing a shuttle-binder, the shuttle and picking mechanism therefor, said shuttle-binder and said shuttle-box wall each having coacting means to yield upon said shuttle, in combination with means to press said binder upon said shuttle to lock it by the impact of the shuttle upon said picker.

58. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of said box throughout its entirety including its pivot or fulcrum, said binder having means for causing a yielding pressure upon said shuttle when pressed upon the shuttle by means operated by the impact of said shuttle.

59. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of said box throughout its entirety, including its pivot or fulcrum, said binder having means to yield upon said shuttle, in combination with means for pressing said binder upon said shuttle by the impact of the shuttle.

60. In a loom, the lay, the shuttle-box having a shuttle-binder, the shuttle and picking mechanism therefor, a shuttle-box wall having means for causing a yielding pressure upon said shuttle, in combination with means to force said shuttle upon said box-wall by the impact of the shuttle.

61. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety and means for causing said binder to be yieldingly pressed upon said shuttle by the impact of the shuttle upon the picker.

62. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety and having means to cause said binder to apply a gradually-increasing spring-pressure upon the ingoing shuttle and means for causing said binder to be yieldingly pressed upon said shuttle by the impact of the shuttle upon the picker.

63. In a loom, the lay, the shuttle-box, the shuttle, and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of the shuttle-box throughout its entirety, and means for causing said binder to apply a gradually-increasing spring-pressure upon said shuttle by the ingoing shuttle and means for causing said binder to be yieldingly pressed upon said shuttle by the impact of said shuttle upon the picker.

64. In a loom, the lay, the shuttle-box, the shuttle, and picking mechanism therefor, a shuttle-binder movable from and toward the opposite side of said shuttle-box throughout its entirety, said binder having a facing on its contact side and yielding means located between said facing and said binder throughout its contact length to coact upon said shuttle.

65. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder pivoted at or near its outer end, and means for causing said binder to be yieldingly pressed upon said shuttle by the impact of the shuttle upon the picker.

66. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a pivoted shuttle-binder having a facing on its contact side and a rubber cushion between said facing and said binder.

67. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder spring-pressed inwardly and movable from and toward the opposite side of the shuttle-box at its outer end and means for causing said binder to apply a gradually-increasing spring-pressure upon the shuttle by the ingoing shuttle to thereby stop the same.

68. In a loom, the lay, the shuttle-box, the shuttle and picking mechanism therefor, a shuttle-binder spring-pressed inwardly and movable from and toward the opposite side of the shuttle-box at its outer end and means for causing said binder to apply a gradually-increasing spring-pressure upon the shuttle by the ingoing shuttle to thereby stop the same and a gradually-decreasing spring-pressure upon the outgoing shuttle.

69. In a loom, a lay, a shuttle and shuttle-binder, and picking mechanism for the shuttle, a strap connected at one end to the lay, a lever upon the lay, said strap passing back of the picker and having its other end connected to said lever, and means permitting a yielding action of said lever when said strap receives the impact of the picker-stick.

70. In a loom, a lay, a shuttle, and shuttle-binder, and picking mechanism for the shuttle, a strap connected to a bracket on the lay, a lever upon the lay, said strap passing back of the picker or picker-stick and having its other end connected to said lever and a rubber cushion permitting a yielding action of said lever when said strap receives the impact of the picker or picker-stick.

71. In a loom, a lay, a shuttle-box, a shuttle and picking mechanism for the shuttle, a strap connected at one end to a bracket on the lay, a lever loosely mounted on a bracket on the lay, said strap passing back of the picker-stick and having its other end connected to said lever and means for causing spring action to said lever and said strap when said strap receives the impact of the picker-stick.

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

FRANCIS ARTHUR MILLS.

Witnesses:

GUY H. JOHNSON,

A. E. H. JOHNSON.