No. 782,569. PATENTED FEB. 14, 1905.

F. LACEY.

SHEDDING MECHANISM FOR LOOMS.

APPLICATION FILED AUG. 1, 1904.

4 SHEETS—SHEET 1.

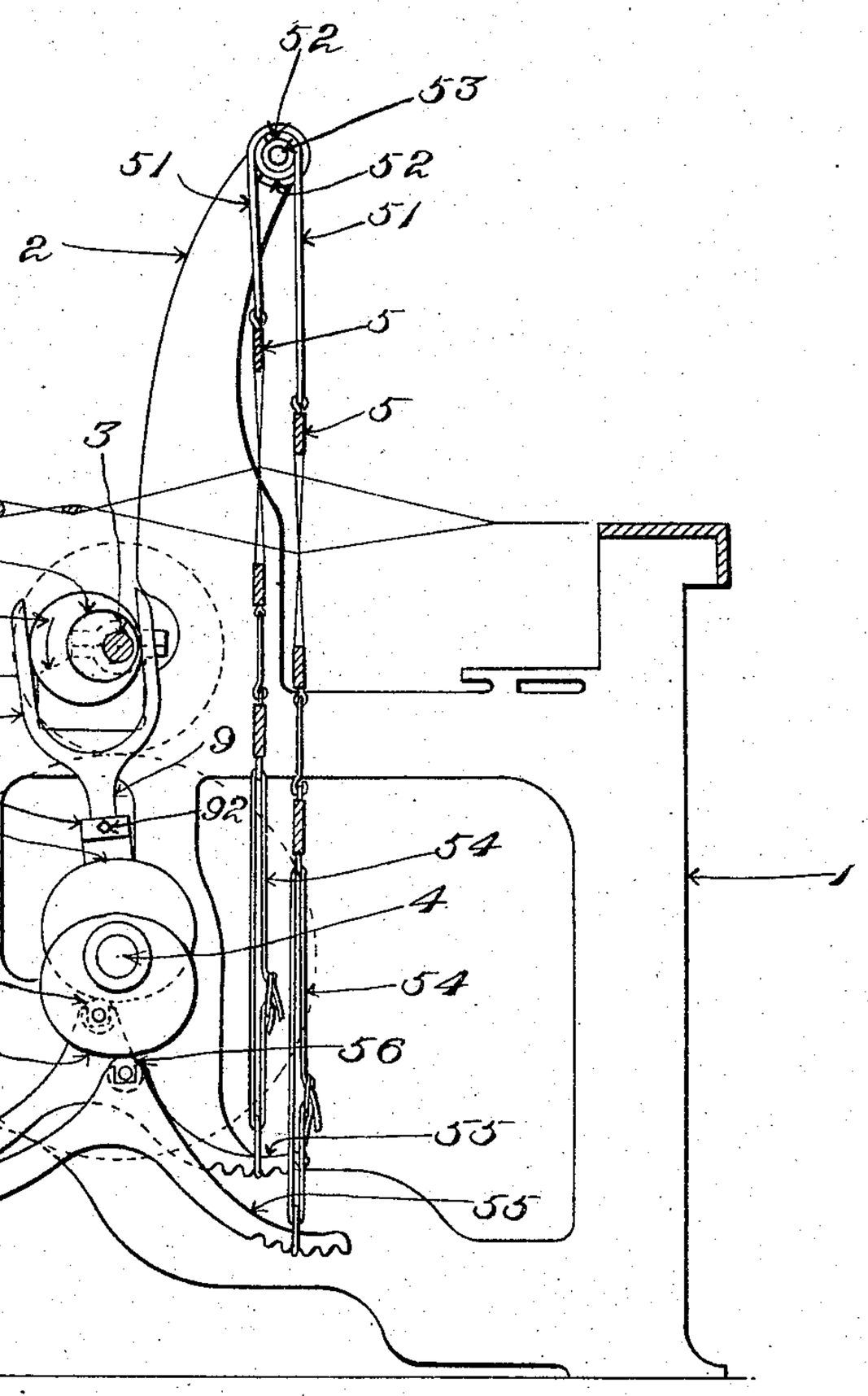

Fig. 1.

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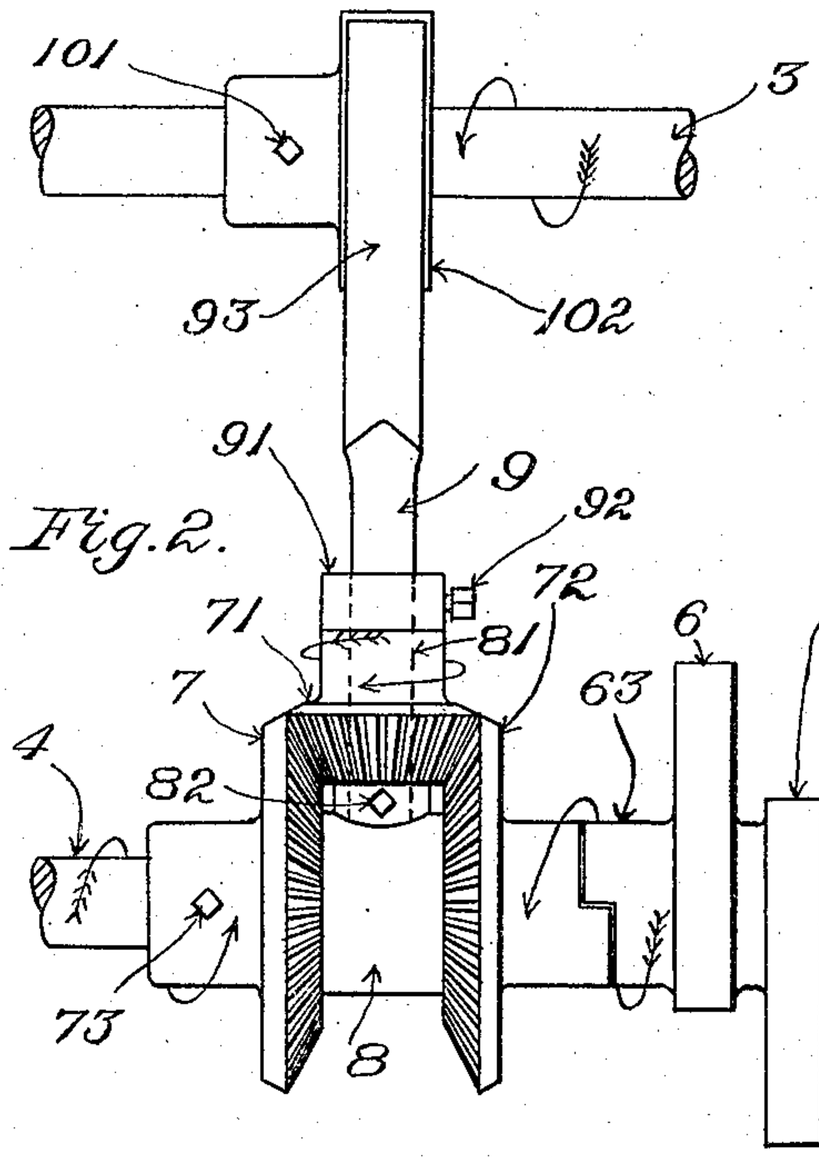

Fig. 2.

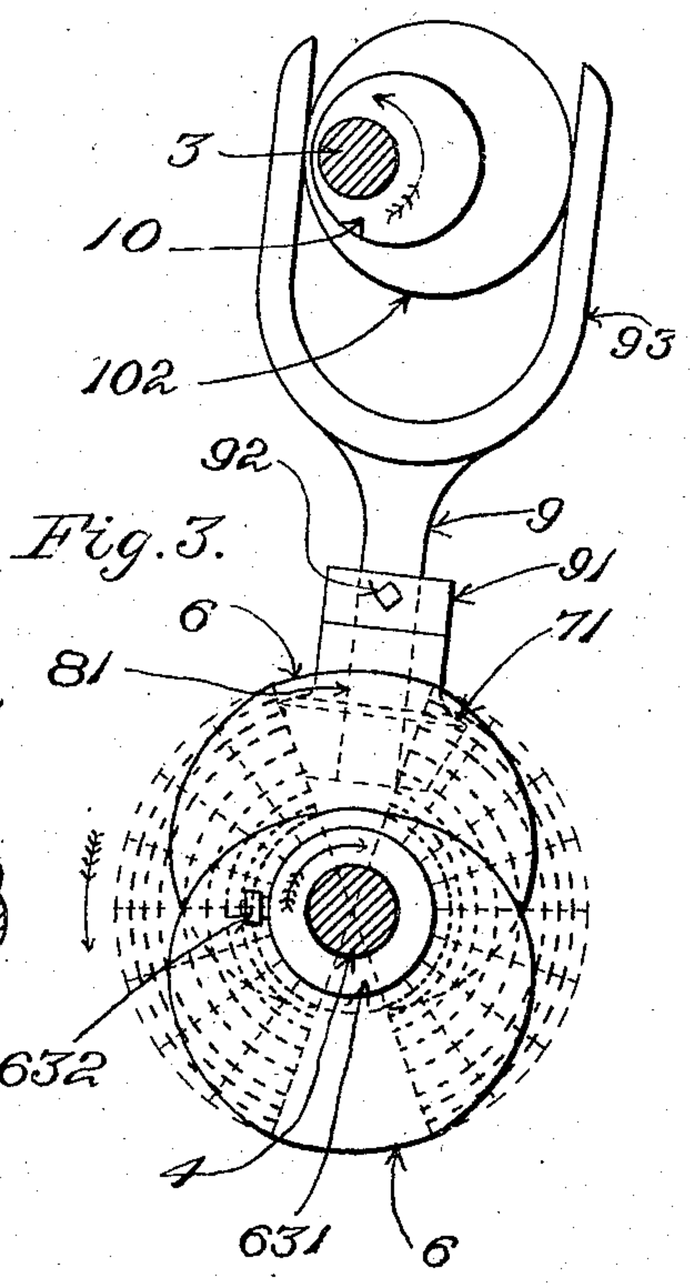

Fig. 3.

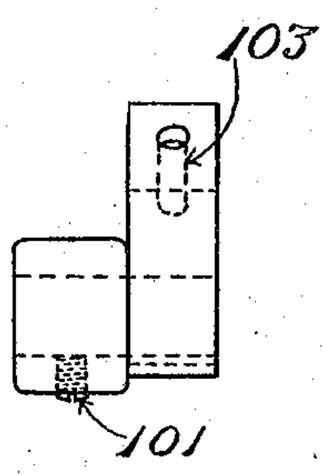

Fig. 4.

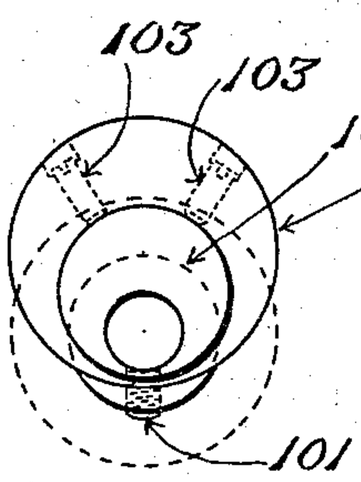

Fig. 5.

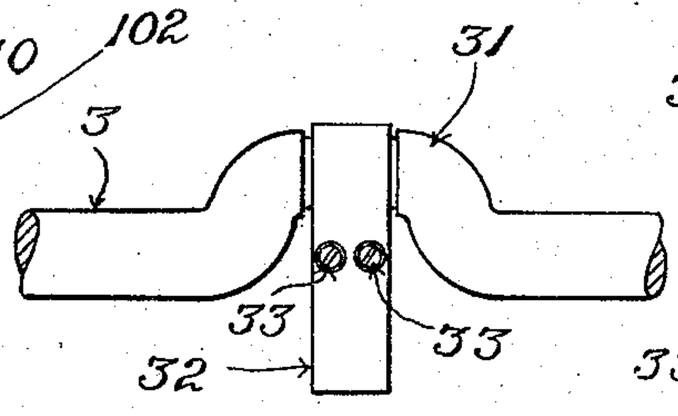

Fig. 6.

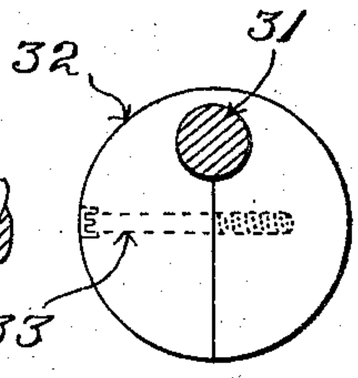

Fig. 7.

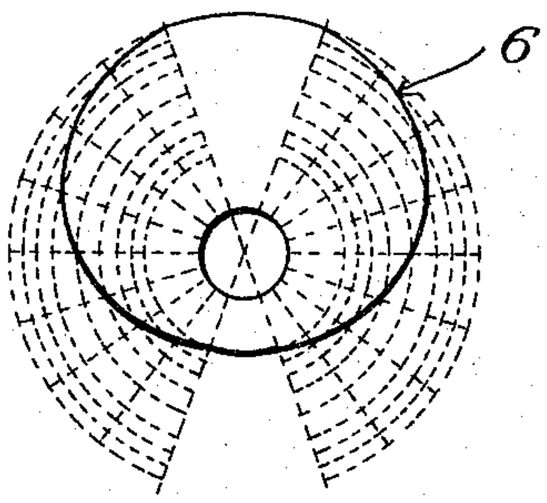

Fig. 8.

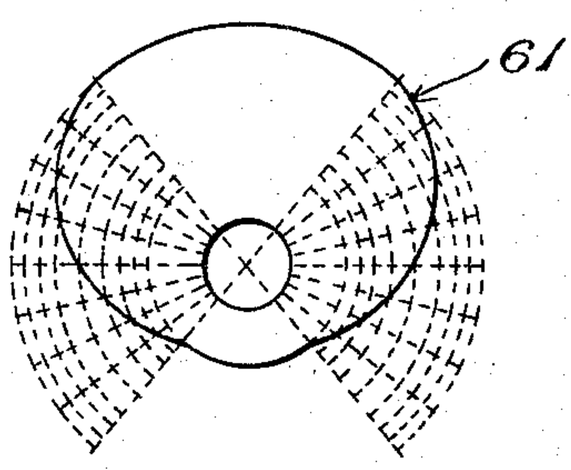

Fig. 9.

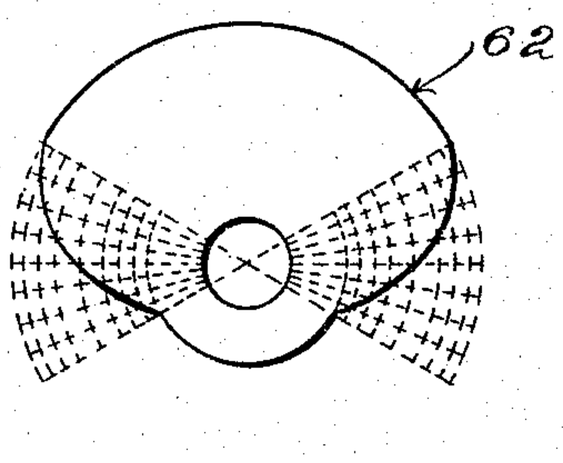

Fig. 10.

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4 SHEETS—SHEET 3.

Fig. 14.

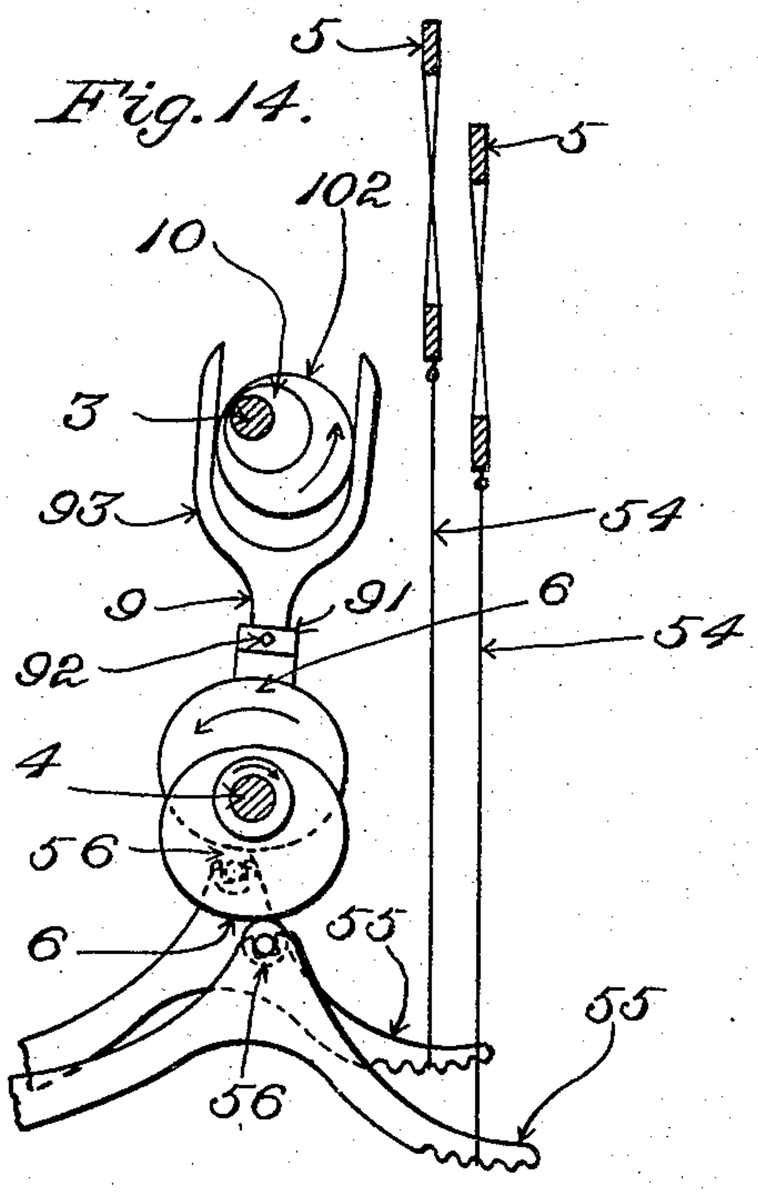


Fig. 13.

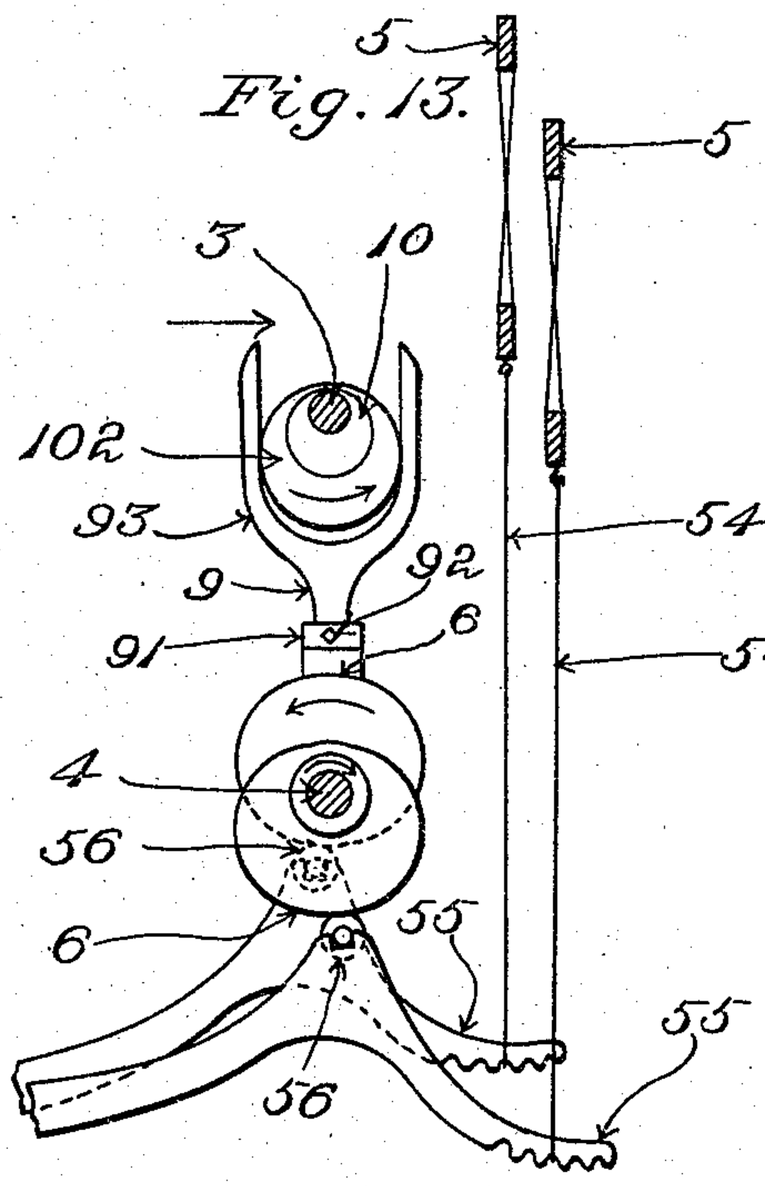


Fig. 12.

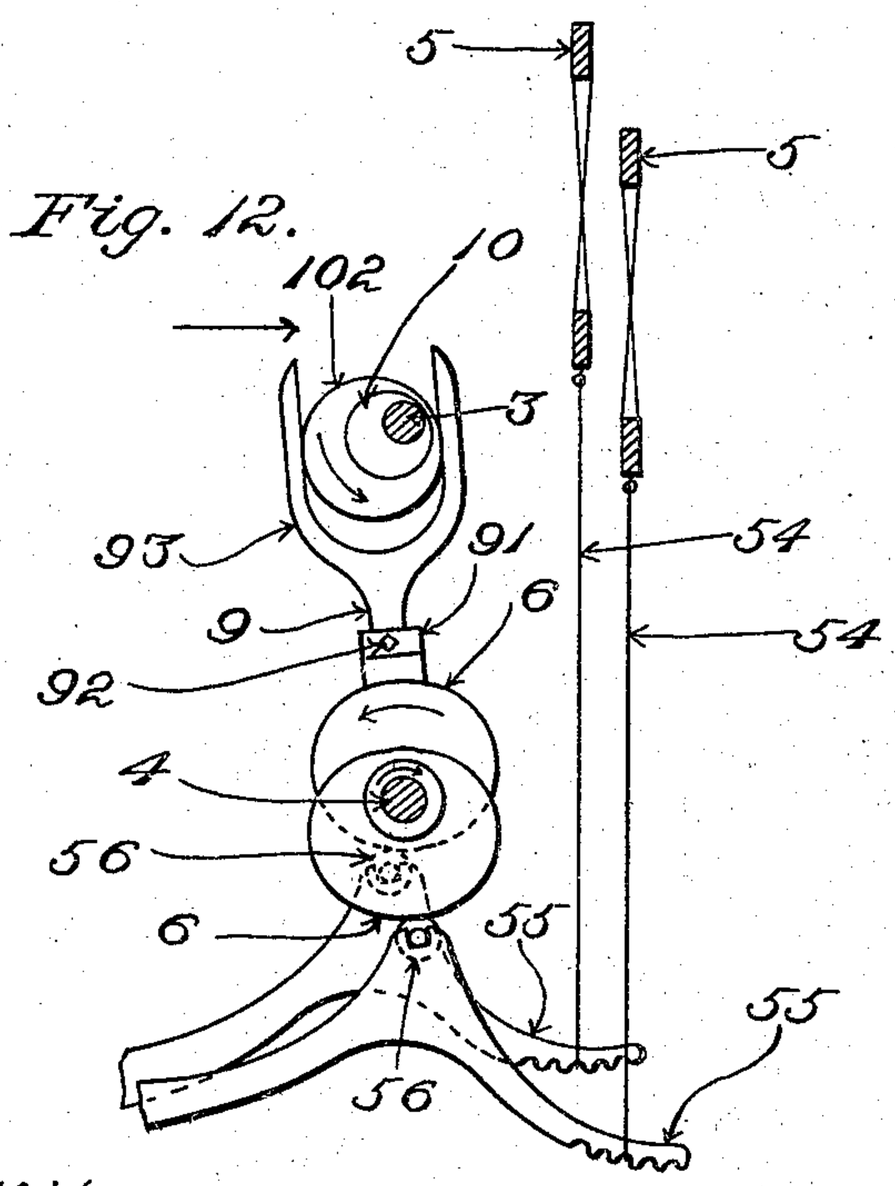
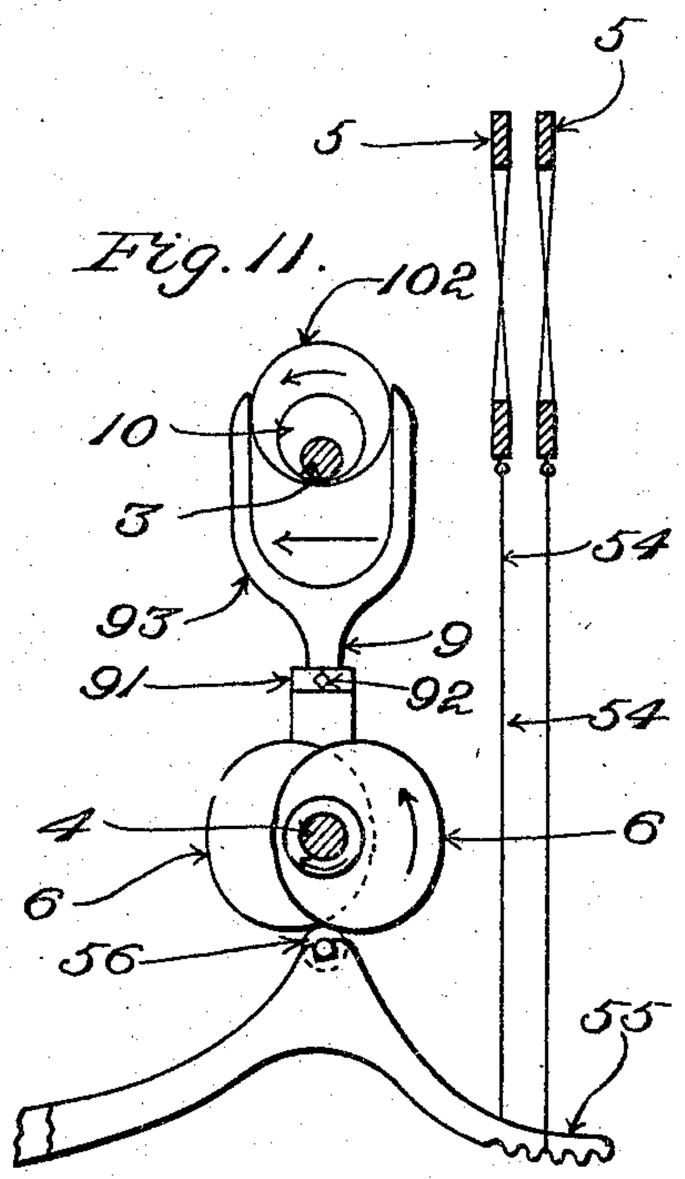


Fig. 11.



Witnesses:
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No. 782,569. PATENTED FEB. 14, 1905.

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SHEDDING MECHANISM FOR LOOMS.

APPLICATION FILED AUG. 1, 1904.

4 SHEETS—SHEET 4.

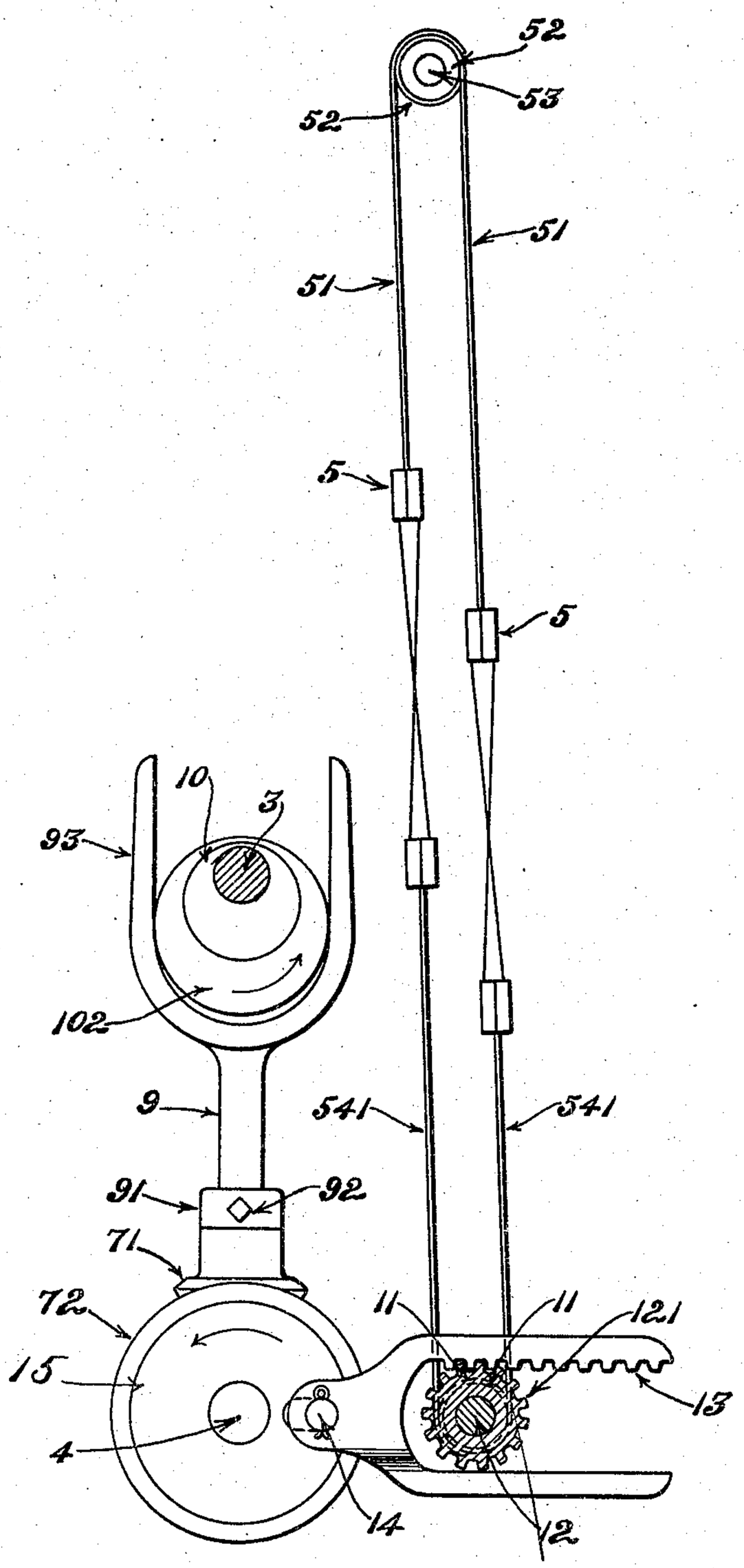

Fig. 15.

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No. 782,569. Patented February 14, 1905.

UNITED STATES PATENT OFFICE.

FRED LACEY, OF VALLEYFIELD, CANADA.

SHEDDING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 782,569, dated February 14, 1905.

Application filed August 1, 1904. Serial No. 218,990.

To all whom it may concern:

Be it known that I, FRED LACEY, a citizen of the United States, residing at Valleyfield, in the county of Beauharnois, Province of Quebec, Dominion of Canada, have invented a certain new and useful Improvement in Shedding Mechanisms for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

As is well understood by those who are skilled in the art, in looms in which cams are employed for the actuation of the harness, harness-cams of different shapes are required for the production of different weights of goods. For instance, a loom for weaving a lawn, which is made from fine yarns and is a very light cloth, should have the harness-cams thereof shaped to move the harness steadily and slowly when changing from one shed to another in order to prevent breakage of warp-yarns, these cams acting to give only sufficient dwell to the harness at the open shed to allow of a clear passage for the shuttle. When weaving cloth of a medium quality, which is a little heavier than lawns, using yarns a little coarser than are used in the latter, it is necessary to employ harness-cams timed to complete the opening of the shed a little earlier and formed to give a little longer dwell when the shed is open, affording a somewhat clearer shed for the shuttle, a clearer shed being required when weaving coarser yarns, inasmuch as these last are somewhat closer together in the reed than in the case of lawns. When weaving sheeting, duck, or any other heavy fabric, it is necessary to employ harness-cams timed to cross the warp-yarns prior to the beating up of the previous pick of weft and formed to complete the opening of the shed still earlier and give a still longer dwell with the shed fully open, it being requisite to cross the warp-threads back of each pick before the latter is struck up to the cloth-making line by the reed of the lay in order that the pick may not spring back as the lay and reed move away from the said line after beating up the pick. Heavy cloths cannot be woven in ordinary or light looms without this crossing of the shed on the pick that is being beaten up. Although an ordinary loom provided with a properly-designed cam can be made to weave reasonably-heavy cloth, a heavy loom with an improperly-designed cam cannot weave heavy cloth. It heretofore has been usual in mills to run looms steadily on goods of the same weight. At the present time it is desirable, in order to meet the varying requirements of trade, to be able from time to time to vary the product of a loom from cloth of one weight to cloth of a different weight.

One general object of the invention is to enable the harness-operating mechanism of a loom to be adjusted quickly and conveniently to adapt the loom to the production of cloths of different weights without removing and replacing the harness-cams or otherwise reconstructing the harness-operating mechanism.

The invention consists, essentially, in the combination, in a loom with harness-operating mechanism either embracing harness-cams shaped suitably for the production of goods of a given weight or otherwise equipped to actuate the harness properly for such production and normally coacting with the other elements of the loom in such production, of devices which may be rendered inoperative when the normal working of the said harness-operating mechanism is desired, but which may be rendered operative when it is desired to adapt the loom for the production of goods of a given different weight to modify the action of the harness to suit the latter weight of goods. The said devices preferably are adjustable to provide for the production of a variety of weights of goods.

The invention is illustrated by the accompanying drawings, in which—

Figure 1 shows portion of a loom in section on a vertical plane extending from front to rear with an embodiment of the invention applied. Fig. 2 shows in rear elevation the parts of Fig. 1 which more particularly are involved in the invention. Fig. 3 shows the parts of Fig. 2 in side elevation, with the crank-shaft and cam-shaft in cross-section. Fig. 4 shows the double or compound eccentric of Figs. 1, 2, and 3 in rear elevation de-

tached. Fig. 5 shows the said double or compound eccentric in side elevation. Fig. 6 shows in front elevation a modification in which a crank and eccentric ring or collar are employed. Fig. 7 shows the ring or collar of Fig. 6 in side elevation. Figs. 8, 9, and 10 are diagrams showing ordinary or usual harness-cams of different shapes or proportions. Figs. 11, 12, 13, and 14 are views somewhat on the order of diagrams, illustrating the working of the embodiment of the invention which is shown by Figs. 1 to 5. Fig. 15 is a view showing the application of the invention to a shedding mechanism of the type in which the harness is actuated by means of a rotating crank or its equivalent.

Having reference to the drawings, portion of one side frame of a loom is represented at 1, Fig. 1, and portion of the arch is shown at 2.

3, Figs. 1 to 3, is the crank-shaft of a loom, and 4 is the cam-shaft thereof, the latter rotating, as usual, at one-half the rate of speed of the former.

5 5, Fig. 1, are harness-frames, 51 51 being straps by means of which the said harness-frames are suspended from the top rolls 52 52, which are carried by the roll-shaft 53, mounted upon the said arch 2. 54 54 are harness-straps extending down from said harness-frames to harness-levers 55 55, the latter being mounted pivotally upon fixed supports, as usual, and engaged by harness-cams 6 6. The said harness-cams are mounted upon the cam-shaft 4 and in their rotation act against rolls 56 56, that are carried by the said harness-levers, thereby communicating to the harness-levers the movements that are transmitted to the harness-frames for the purpose of actuating the latter.

Figs. 1, 2, and 3 of the drawings show an embodiment of the invention employed in connection with harness-cams 6 6, corresponding in form with the cam shown separately in Fig. 8, the said cams being suited for use in weaving fine yarns in the production of lawns. For convenience in making comparison and in order to insure a correct understanding of the purposes of the invention I have shown in Fig. 9 a harness-cam 61, which is formed to give a little longer dwell than cams 6 6, the said cam being adapted to operate as hereinbefore set forth and being suited for medium yarns and medium-weight goods. Fig. 10 shows a cam 62, which is formed to give a still longer dwell, the said cam being adapted to operate as hereinbefore set forth and being suited for heavy-weight goods. The invention is designed to enable the harness-cams 6 6 of Figs. 1, 2, 3, and 8 to be modified in operation when desired, so as to secure, for example, the same dwells of the open sheds and operation as in the case of the cam 61 of Fig. 9 and the cam 62 of Fig. 10, respectively.

Referring to Figs. 1, 2, and 3, the two harness-cams 6 6 are shown mounted upon the cam-shaft 4, as usual, although the invention is not limited in this respect. The sleeve 63 upon which the said harness-cams are formed or with which they are connected is free to turn upon the cam-shaft. For the actuation of the harness-cams they are in operative connection with the cam-shaft by a gear-train through which motion is transmitted from the latter to the former, the said gear-train constituting portion of a differential mechanism. The character and arrangement of the gear-train may vary without involving departure from the spirit of the invention. In the present instance it comprises a bevel-gear 7, which is made fast upon the cam-shaft by a clamping-screw 73, an intermediate or carrier bevel-gear 71, which is mounted as presently will be described, and a bevel-gear 72, that is mounted upon the cam-shaft 4 with capacity to turn independently of the latter, and either is fixedly connected with sleeve 63 or in clutch connection therewith, as shown. The intermediate or carrier bevel-gear 71 is supported by a swinging carrier comprising a swivel 8 and an arm 9, extending therefrom. The said swivel consists of a sleeve that is fitted upon the cam-shaft 4 between the bevel-gears 7 72 so as to hold the latter at the requisite distance apart from each other, the said sleeve having a radial socket 81, in which the inner extremity of the said arm is received and secured by a clamping or binding screw 82. The intermediate or carrier bevel-gear 71 is journaled upon the stem of the said arm and is stepped upon the outer end of the socketed portion of the swivel. The said bevel-gear is held in proper engagement with the bevel-gears 7 72 by means of a collar 91, that is fitted upon the stem of the arm 9 and secured in place thereon by means of a clamping or binding screw 92. The bevel-gear 72 and sleeve 63 are confined between the swivel 8 and a collar 631 upon the cam-shaft 4, the said collar being secured in place upon the cam-shaft by means of a clamping or binding screw 632.

In the working of the loom the normal action of the harness-cams 6 6 is secured by causing the carrier 8 9 to remain in a given position. So long as the said carrier is held in a fixed position the said harness-cams will be caused to rotate at a uniform rate of speed, and they will operate normally in the production of the goods for which their shape and proportions are especially designed. A differential movement of the harness-cams by which the action of the latter is modified to suit the production of goods of different weights is produced by communicating to the carrier a complete oscillation or vibration for each shed formation. In the present instance the carrier is in operative connection with the crank-shaft through the medium of an actuator that is applied to the latter. The

said actuator in Figs. 1 to 5 is constituted by an eccentric of adjustable throw. In the said figures it consists of a compound eccentric comprising the inner eccentric member 10, sleeved upon the crank-shaft 3 and made fast thereto by means of a clamping or binding screw 101 and the outer eccentric member 102, fitting around the eccentric body of the member 10 and secured in the desired position upon the said body by clamping or binding-screws 103 103. The described construction enables the periphery of the outer member 102 to be adjusted either into concentricity with the crank-shaft, as shown by dotted lines in Fig. 5, or into position to secure any desired extend of throw within the capacity of the device. Fig. 5 shows in full lines the double or compound eccentric adjusted as required in order to secure the full or maximum throw thereof, which is also the adjustment thereof in Figs. 1 to 3. For engagement with the actuator the arm 9 of the swinging carrier is furnished with a fork or yoke 93, embracing the actuator. When the compound or double eccentric is set or adjusted as indicated by the dotted lines of Fig. 5, so that the exterior of the same is concentric with the crank-shaft, it serves to hold the carrier in its stationary or fixed position, and thus to secure the rotation of the harness-cams at a uniform rate of speed, as aforesaid. When the said double or compound eccentric is set or adjusted so that its periphery is disposed eccentrically with relation to the crank-shaft, it imparts a swinging movement to the carrier.

Having reference now more particulary to Figs. 2 and 3, in which the directions of rotation of the crank-shaft, cam-shaft, and harness-cams, respectively, are indicated by the arrows, the action is substantially as follows: Starting with the parts in the positions in which they are represented in Figs. 2 and 3, as the carrier and the gear 71, mounted thereon, move in the direction from right to left in Fig. 3 an accelerated rate of rotation is communicated to the harness-cams, during which part of the action the closing of one shed occurs and the opening of the new shed begins. Fig. 11 shows the positions of the actuator, carrier, harness-cams, harness-levers, and harness-frames at the middle of the period of acceleration, the shed being in the closed condition. By this acceleration the opening of the new shed is caused to begin at an earlier moment in the cycle of movements of the loom than in the normal or usual operation. As the carrier completes its stroke toward the left in Fig. 3 the rate of speed of rotation of the harness-cams diminishes to the normal, the full portions thereof being at such time in engagement with the harness-levers and the new shed being completely open. Figs. 1 and 12 show the parts in the positions occupied by them during the slight dwell of the carrier at the end of the said stroke. As the carrier and gear 71 make their return stroke from left to right the rate of the rotation of the harness-cams is first retarded, and a dwell in such rotation may also be occasioned, the shed remaining open, as in Fig. 13, and then the rate is gradually returned to the normal as the carrier arrives at the end of its stroke toward the right, as in Fig. 14. In consequence of the said retardation or retardation and dwell the closing of the shed is caused to occur at a later instant in the cycle of movements of the loom than in the normal or usual operation. It will be clear that this mode of operation results not only in beginning to open the shed earlier, but in a longer dwell of the open shed, the result being an action the same in effect as that of either the cam 61 of Fig. 9 or the cam 62 of Fig. 10, according to the proportions or adjustment of the actuator. In the present instance the action of the harness-cams in shedding is caused to correspond with the normal action of the cam 62 in Fig. 10. The extent to which the normal action of the cams 6 6 will be modified will depend upon the extent of the throw that is given to the actuator. By the employment of an actuator of adjustable throw the mechanism is rendered capable of being adapted to the production of goods of various weights.

Figs. 6 and 7 show a modified form of actuator for the swinging cam, in which the crank-shaft 3 is provided with a crank 31, on which an eccentric 32 is mounted. The eccentric 32 is in halves, which are drawn together and clamped upon the crank by means of screws 33 33. The crank construction has the advantage, as compared with the construction shown in Figs. 1 to 5, that a crank gives double the movement that is given by an eccentric with the same diameter.

While I have been particular to describe completely the foregoing embodiment of the invention and to set forth fully the mode of operation thereof, I do not regard my invention as necessarily limited with respect to the details herein set forth, and I do not in all cases limit my invention to the employment of the precise differential mechanism herein shown and described.

Fig. 15 illustrates the application of the invention to a shedding mechanism of the type in which the harness is in operative connection with a rotating crank or its equivalent and is actuated thereby. In Fig. 15 the harness-straps 541 541, extending down from the harness-frames, are joined to rolls 11 11 on the lower roll-shaft 12, which last is supported in bearings that are carried by the lower portion of the loom-frame. For the actuation of the harness-frames the said lower roll-shaft 12 has fast upon one end thereof a pinion 121 and with the teeth of the said pinion are caused to engage the teeth of a rack 13, the latter be-

ing connected pivotally with a crank-pin 14, which is carried by a rotating wheel 15. The wheel 15 is mounted upon and concentrically with cam-shaft 4, although it is free to turn independently with relation to the driving-shaft. It may correspond with the wheel 72 of Figs. 1, 2, and 3 or be connected with the said wheel 72, so as to turn in unison therewith. By the rotation of the crank the rack is reciprocated, and thereby an oscillating movement is communicated to the roll-shaft, by means of which the harness is operated in well-known manner. By means of the differential mechanism when the latter is brought into action a differential movement of the rotating crank is occasioned, essentially the same as in the case of the cams 6 6 of the modification first set forth, the effect of the said differential movement upon the sheds being substantially the same.

I have made the embodiment of the invention which is shown in Fig. 15 the subject of a divisional application, filed August 12, 1904. Serial No. 220,492. In some instances I contemplate employing a crank of adjustable throw on the order of that shown and described in the said divisional application as an actuator for the carrier.

What I claim is—

1. In a shedding mechanism for looms, the combination with the harness, harness-levers, harness-cams, and operating means for the latter, of devices to modify the normal action of the said cams, when desired, by occasioning a differential movement thereof and thus varying the length of dwell of the open sheds.

2. In a shedding mechanism for looms, the combination with the harness, harness-levers, and harness-cams, of mechanism to impart differential movement to the said cams, adjustable to vary the length of dwell of the open sheds.

3. In a shedding mechanism for looms, the combination with the harness, harness-levers, harness-cams, and means to operate the said cams, of differential-motion devices by which the action of the said cams in crossing the warp-threads is accelerated.

4. In a shedding mechanism for looms, the combination with the harness, harness-levers, harness-cams, and means to operate the said cams, of the differential-motion devices, provided with an actuator adjustable to render the said devices operative or inoperative.

5. In a shedding mechanism for looms, the combination with the harness, and the operating mechanism therefor, of means to modify the normal action of the said harness in shedding to suit a different cloth by changing the length of dwell of the open shed.

6. In a shedding mechanism for looms, the combination with the harness, and the operating mechanism therefor, of means to modify the normal action of the said harness in shedding to suit different cloth by changing the length of dwell of the open shed, and adjustable to suit different lengths of dwell.

7. In a shedding mechanism for looms, the combination with the harness, and means to actuate the same, of differential devices adapted to be rendered operative to modify the normal action of the harness in shedding to vary the length of dwell of the open shed.

8. In a shedding mechanism for looms, the combination with the harness, harness-levers, harness-cams, and means to operate the said cams, of means to vary the length of dwell of the open shed.

9. In a shedding mechanism for looms, the combination with the harness, harness-levers, harness-cams, and means to operate the said cams, of means whereby to enable the rotary movement of the cams to be modified to vary the length of the dwell of the open shed.

10. In a shedding mechanism for looms, the combination with the harness, harness-levers, and harness-cams, of means to rotate the said cams, and means to vary the length of the dwell of the open shed, adapted to be placed in and out of action as desired.

11. In a shedding mechanism for looms, the combination with the crank-shaft, harness, harness-levers, and harness-cams, of means to rotate the said cams, devices to vary the length of the dwell of the open shed, and an actuator for said devices itself actuated by the crank-shaft.

12. In shedding mechanism for looms, the combination with the harness-cams, of a gear-train for operating the said cams, the gear-carrier supporting a portion of the said train and operating by its movement to modify the rotary movement which is communicated to the cams, and means whereby to actuate the said gear-carrier.

13. In shedding mechanism for looms, the combination with the crank-shaft, and the harness-cams, of a gear-train for operating the said cams, the gear-carrier supporting a portion of the said train, and the actuator for said gear-carrier, actuated by the crank-shaft.

14. In shedding mechanism for looms, the combination with the crank-shaft, and the harness-cams, of a gear-train for operating the said cams, the gear-carrier supporting a portion of the said train, and the actuator for said gear-carrier, adjustable to vary the length of the dwell of the open shed.

15. In shedding mechanism for looms, the combination with the crank-shaft, and the harness-cams, of a gear-train for operating the said cams, the gear-carrier supporting a portion of the said train, and the actuator for said gear-carrier comprising the eccentric of adjustable throw.

16. In shedding mechanism for looms, the combination with a driving bevel-gear, as 7, a driven bevel-gear, as 72, an intermediate bevel-

gear, harness-cams operatively connected with the said driven bevel-gear, a carrier for said intermediate bevel-gear, and means to oscillate the said carrier.

17. In shedding mechanism for looms, the combination with a driving bevel-gear, as 7, a driven bevel-gear, as 72, an intermediate bevel-gear, harness-cams operatively connected with the said driven bevel-gear, a carrier for said intermediate bevel-gear, and an adjustable actuator for oscillating the said carrier.

18. In shedding mechanism for looms, the combination with a rotating shaft of the loom, a driving bevel-gear fast thereon, a driven bevel-gear, harness-cams in operative connection with said driven bevel-gear, an intermediate bevel-gear, a carrier for said intermediate bevel-gear, an actuator for said carrier, and a rotary shaft on which the said actuator is mounted.

19. In shedding mechanism for looms, the combination with the harness, of a driven bevel-gear in operative connection with said harness, a driving bevel-gear, an intermediate bevel-gear, a carrier for said intermediate bevel-gear, and means to oscillate said carrier.

20. In shedding mechanism for looms, the combination with the harness, of a driven bevel-gear in operative connection with said harness, a driving bevel-gear, an intermediate bevel-gear, a carrier for said intermediate bevel-gear, and an actuator for said carrier which may be placed in and out of action when desired.

21. In shedding mechanism for looms, the combination with the harness, of a driven bevel-gear in operative connection with said harness, a driving bevel-gear, an intermediate bevel-gear, a carrier for said intermediate bevel-gear, and an actuator for said carrier which may be adjusted to vary the length of dwell of the open shed.

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

FRED LACEY.

Witnesses:

CHAS. F. RANDALL,

EDITH J. ANDERSON.