

(No Model.)

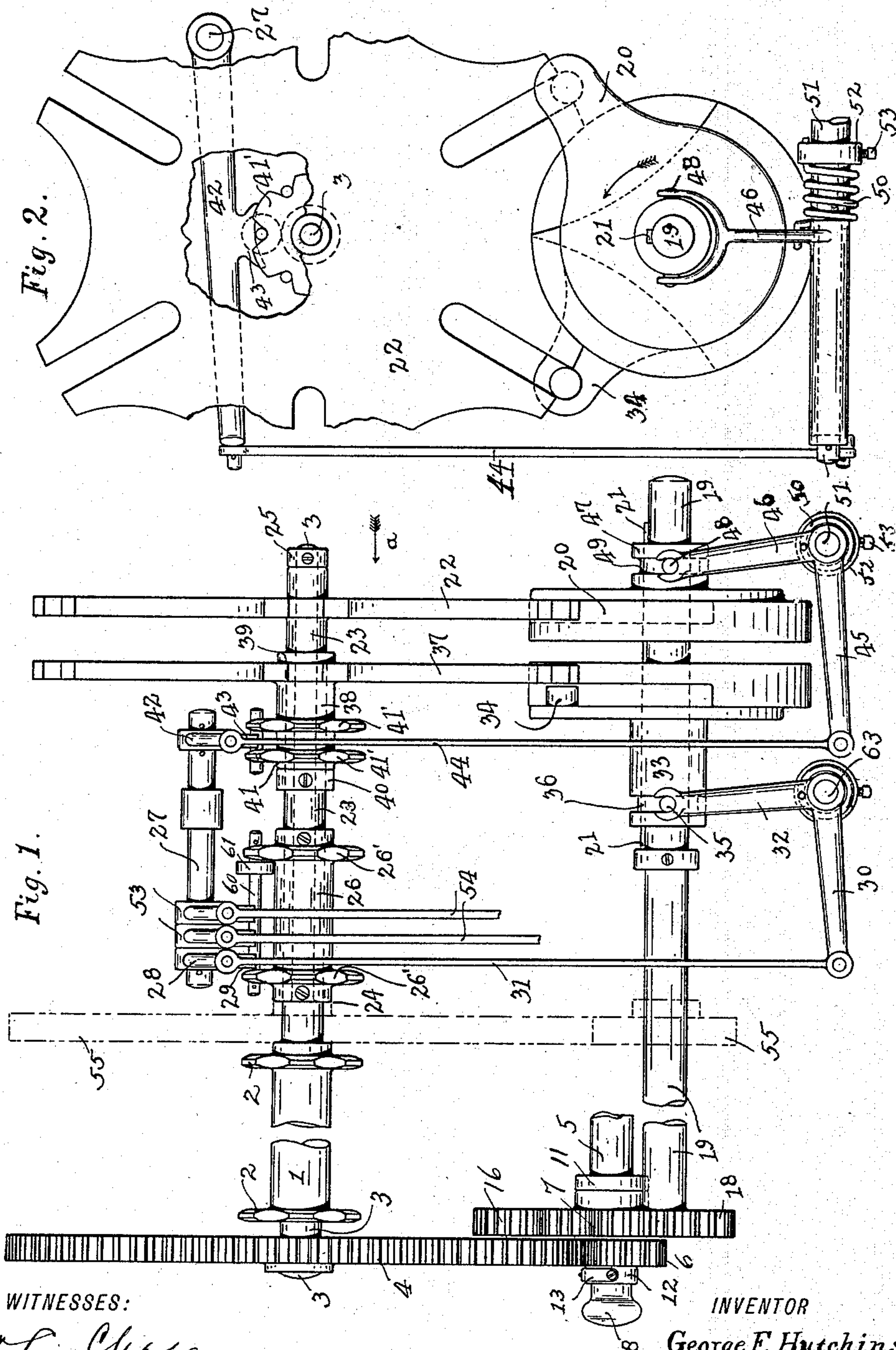
2 Sheets—Sheet 1.

G. F. HUTCHINS.

LOOM.

No. 413,369.

Patented Oct. 22, 1889.



WITNESSES:

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INVENTOR

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 6.

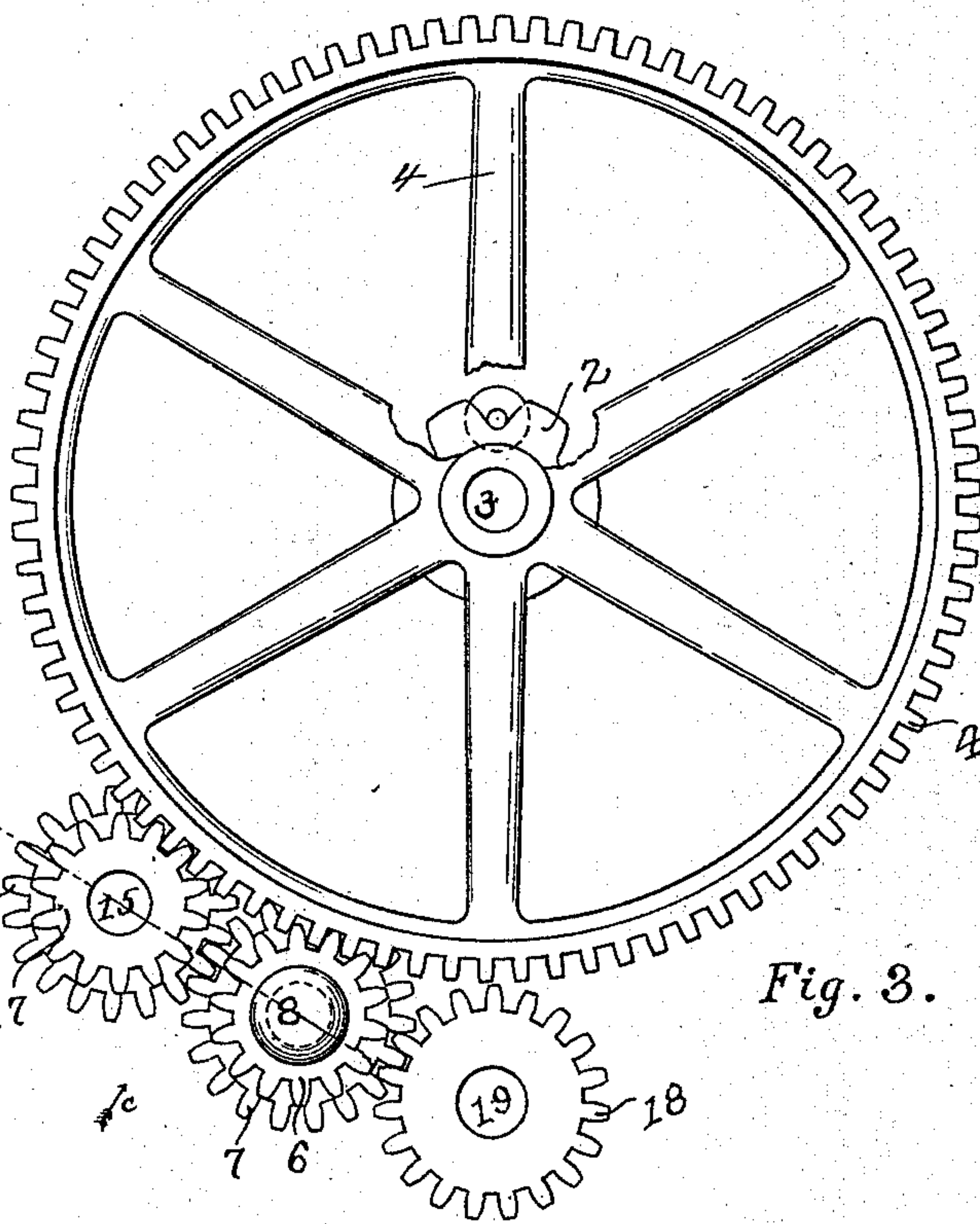
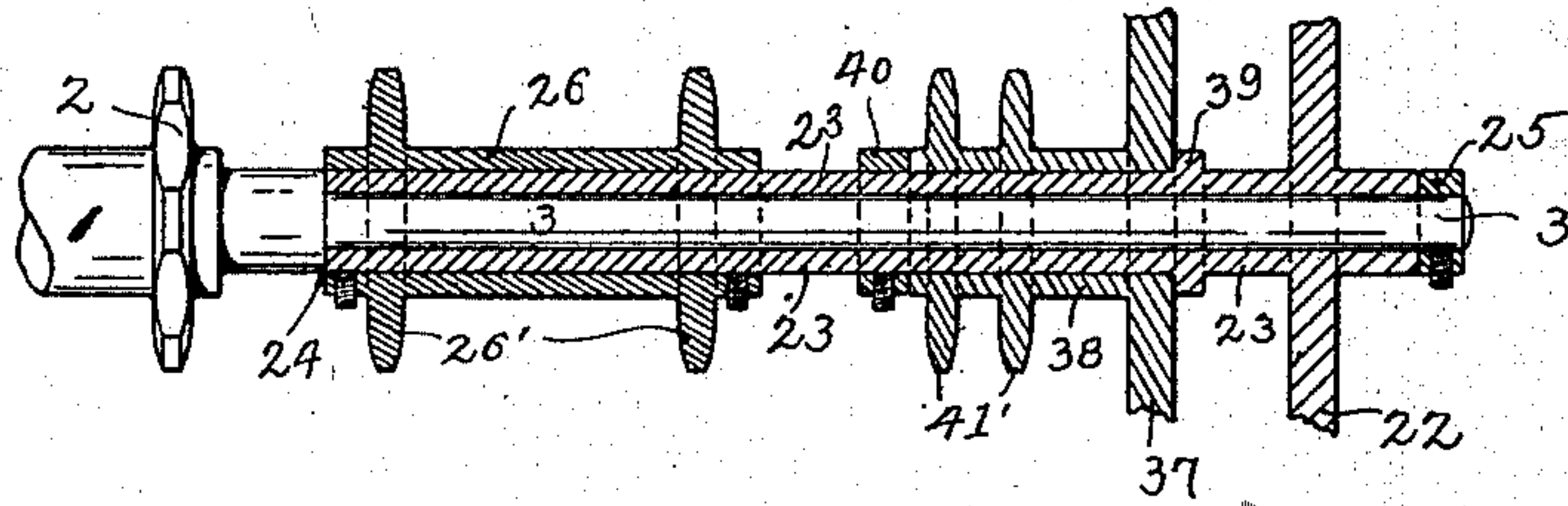


Fig. 3.

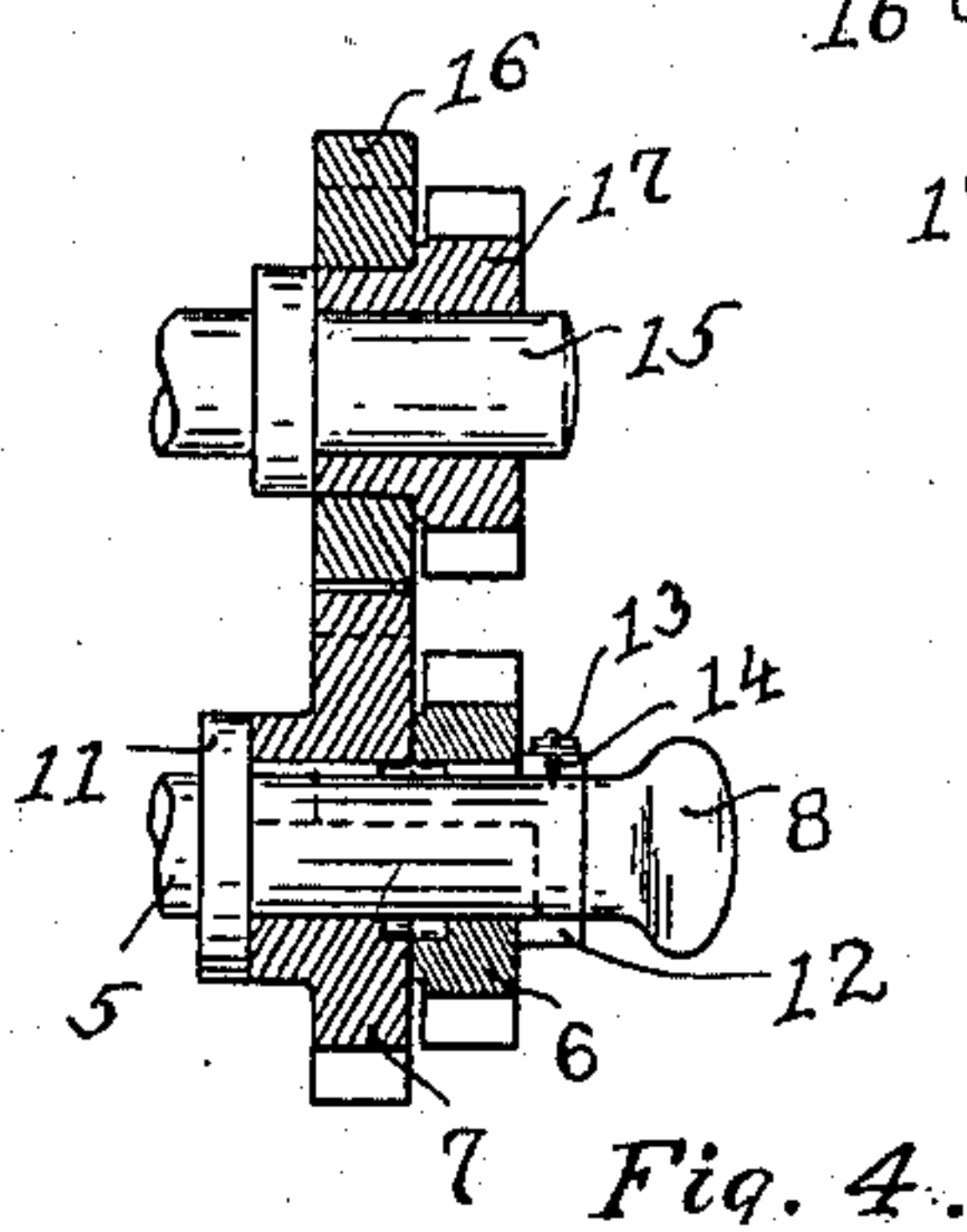


Fig. 4.

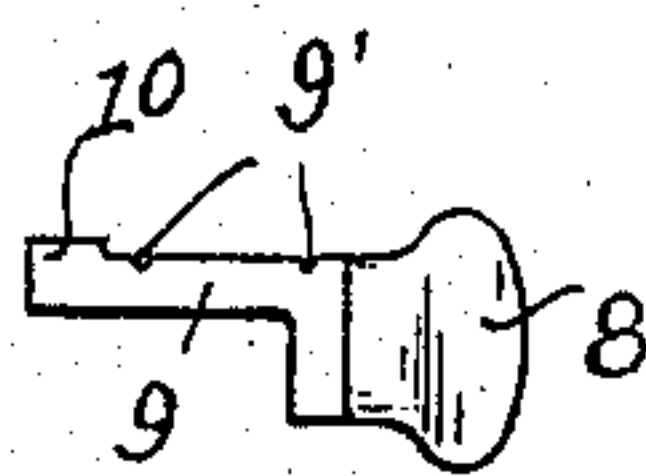


Fig. 5.

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UNITED STATES PATENT OFFICE.

GEORGE F. HUTCHINS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE
KNOWLES LOOM WORKS, OF SAME PLACE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 413,369, dated October 22, 1889.

Application filed March 25, 1889. Serial No. 304,631. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. HUTCHINS, a citizen of the United States, residing at Worcester, in the county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Looms; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to looms, and more particularly to mechanism for operating drop-box-pattern indicators in looms; and the object of my invention is to provide means by which certain bars of the box-pattern indicators may be repeated without constructing successive similar bars, and at the same time to so connect the box-pattern mechanism with the harness-pattern mechanism that the two will not be thrown out of time with each other when the harness-pattern mechanism is reversed in the operation of picking out imperfect work or otherwise. The box-pattern mechanism consists of two sets of indicators—a main and auxiliary set—each driven by a pin-wheel and a star-wheel, and each pin-wheel fitted to be slid into or out of engagement with its respective star-wheel, according to indicators, moved by the opposite star-wheel, in a manner similar to that described in United States Patent No. 396,057, of January 8, 1889.

I carry out my invention by driving the box-mechanism pin-wheel shaft from the harness-pattern-indicator shaft or its driving mechanism in a manner which will be hereinafter fully described, so that when the harness-indicators are reversed the box-pattern mechanism is reversed.

Referring to the drawings, Figure 1 is a side view of the working parts of my improved mechanism detached. Fig. 2 is an end view of some of the parts shown in Fig. 1, looking in the direction of arrow *a*, same figure. Fig. 3 is an opposite end view of some of the parts detached, looking in the direction of the arrow *b*, Fig. 1. Fig. 4 is a section on line X, Fig. 3, looking in the direction of arrow *c*, same figure. Fig. 5 is a detail of the re-

verse key shown in Figs. 3 and 4, and Fig. 6 is a central longitudinal section of the shaft 3 and parts mounted thereon.

In the accompanying drawings, 1 represents the harness-pattern barrel provided with notched flanges 2 to carry indicators (not shown) made up of chain-bars, links, and rolls of the ordinary construction. The barrel 1 is fast upon shaft 3, and upon the end of shaft 3 is secured a gear-wheel 4, driven by a set of reverse gears in the ordinary manner in the well-known Knowles loom, and as set forth in United States Patent No. 134,992.

Loose on the end of the shaft 5, Figs. 1 and 4, through which power is applied, are a pair of gears 6 and 7, which are splined to receive the end of reverse key 8, (see Figs. 4 and 5,) seated in a spline in the shaft 5. The stem 9 of the reverse key 8 is fitted flush with the surface of the shaft, the projection 10 being fitted to engage the spline in the gears, either of which may be driven with the shaft 5, according as the key 8 is pushed in to engage gear 7 or pulled out to engage gear 6, the gear which is out of engagement with the key being loose upon the shaft. The gears 6 and 7 are confined upon the shaft 5 laterally by the flange 11 integral with the shaft and the collar 12 fast upon the outer end of the shaft. (See Fig. 4.) Coiled partially around the collar 12 is a flat spring 13, fastened to the collar at one end and free at the other. To the free end of the spring 13 is secured a pin 14, which projects through a slot in the collar 12, and is pressed by the tension of the spring 13 into notches 9' in the face of the stem 9 of the key 8. The notches 9' are so placed as to hold the key 8 in proper position for engagement with the respective gears 6 and 7. To avoid the possibility of both gears being engaged at the same time by the key 8, and consequent damage to some of the parts of the mechanism should power be applied, the gears 6 and 7 are chambered to the depth of the spline at their adjoining faces for a length equal to the length of the projection 10 on the stem of key 8, so that in sliding the key 8 it leaves the spline of one gear when it enters that of the other. Mounted upon a stud 15 is a gear 16, which meshes with gear 7 of the driving-shaft 5, and which

is fast to the hub of a second gear 17, which is loose upon the stud 15. (See Fig. 4.) Gears 7 and 16 are enough larger than 6 and 17, so that the teeth of the latter clear each other when 7 and 16 are properly meshed.

The stud 15 and shaft 5 are so situated with reference to shaft 3 that gears 6 and 17 are both in mesh with gear 4. Gears 7 and 16 are of the same size, and gears 6 and 17 are of the same size, and so proportioned to gear 4 that one complete revolution of gear 6 or gear 17 turns shaft 3 through the angular space between two contiguous notches in the harness-pattern barrel-flanges 2. When the key 8 is pushed into engagement with gear 7, the harness-pattern barrel 1 is driven through the intermediate gears 16 and 17 in its normal direction, with the loom running forward. When the key 8 is pulled out into engagement with gear 6, the harness-pattern barrel is driven directly through gear 6 in the reverse direction. This construction is used on said Knowles loom, before referred to, for the reason that in said loom the harness-acting mechanism cannot be turned backward, the object being to reverse the harness-pattern indicators, while the loom or its harness-actuating mechanism is turned in the process of picking out imperfect work, &c.

In applying my improvements to said Knowles loom, I have found it convenient to gear my box-mechanism pin-wheel shaft to reverse gear 7, which I do by putting gear 18, of the same size as gear 7 and fast upon the end of pin-wheel shaft 19, in mesh with gear 7. Shaft 19 projects for some distance beyond the harness-pattern barrel 1. (See Fig. 1.) Near the opposite end of shaft 19 from gear 18 is mounted a pin-wheel 20, free to slide upon the shaft, but compelled to rotate in unison with it by means of the feather 21 set in the shaft. Pin-wheel 20 is fitted to engage a star-wheel 22, integral with sleeve 23, which is mounted loosely upon a continuation of harness-indicator shaft 3, and which is confined laterally on the shaft by a shoulder 24 and a collar 25, fastened on the end of the shaft 3. (See Fig. 1.) Fast upon the end of sleeve 23, which adjoins shoulder 24, is the main pattern-barrel 26 of the box mechanism, provided with notched flanges 26' to carry indicators, made up of chain-bars 60, rolls 61, and links (not shown) similar to those employed in the harness-pattern indicator, and of ordinary construction. Pivoted on a stud 27, above and at the rear of main box pattern-barrel 26, is a lever 28, provided with a foot 29, adapted to be engaged by the main pattern-indicators. A link 31 connects the outer end of lever 28 with arm 30 of a bell-crank lever 30 32, pivoted on a stud 63 below shaft 19. Arm 32 of the bell-crank lever 30 32 is forked about the hub 33 of a pin-wheel 34, which is mounted upon shaft 19, similarly to pin-wheel 20. Resting in the fork of arm 32 is a yoke 35, which is fitted loosely in the groove 36 in the pin-wheel hub 33. Pin-wheel

34 is fitted to engage a star-wheel 37, integral with a sleeve 38, which is mounted loosely upon sleeve 23, and which is confined laterally by flange 39 integral with sleeve 23 and a collar 40 fastened upon said sleeve. Sleeve 38 carries the notched flanges 41' of the auxiliary pattern-barrel 41 of the box mechanism, over which, on stud 27, is pivoted a lever 42, similar to lever 28, and provided with a foot 43, adapted to be engaged by auxiliary pattern-indicators. A link 44 connects the outer end of lever 42 with arm 45 of a bell-crank lever 45 46, pivoted on a stud 51 below shaft 19. Arm 46 of the bell-crank lever 45 46 is forked about hub 47 of pin-wheel 20, and carries a yoke 48, fitted loosely in the groove 49 in hub 47. A spring 50 is coiled about the shank of stud 51, one end of which is fast in a collar 52, fastened by set-screw 53 to stud 51, and the other end of which engages arm 46 of the bell-crank lever 45 46. The spring 50 is of sufficient strength, and its tension is so adjusted, by turning collar 52 on the stud 51, that when no indicator-roll is under the foot 43, the spring 50 slides the pin-wheel 20 on shaft 19 into engagement with star-wheel 22. Pin-wheel 34 is slid on shaft 19 out of engagement with its star-wheel 37 by a similar spring coiled on the stud 63 of bell-crank lever 30 32 when no indicator-roll is under foot 29 of lever 28. The arms of the bell-crank levers and the levers 28 and 42 are so proportioned to the distance through which the levers are moved, by lifting the feet 29 and 43 from resting on a bar to resting on a roll, that such motion slides the pin-wheels on their driving-shaft the right distance to be properly in or out of engagement with their star-wheels.

The indicators for the box-shifting mechanism are placed on the same bars with the pin-wheel indicators on the main pattern-barrel of the box mechanism, and the levers 53 for transmitting the indications to the box-shifting mechanism are pivoted on the same stud 27 with lever 28. Depending from levers 53 are links 54, (shown broken off,) with which the levers 53 are connected to the box-shifting mechanism. (Not shown and of ordinary construction.)

The pin-wheels 20 and 34 are so set on the feather 21 that the auxiliary pin-wheel 34 has completed the action on its star-wheel 37 when pin-wheel 20 begins to act on its star-wheel 22, both actions occupying something less than a complete revolution of pin-wheel shaft 19.

The pin-wheels and star-wheels are so proportioned that one movement thereof turns the pattern-barrels through the angular space between two contiguous notches.

The operation of the box-pattern mechanism is as follows: Figs. 1 and 2 represent the main pattern-barrel 26 as in engagement to be actuated and the auxiliary pattern-barrel 41 as at rest. Suppose the action of pin-wheel 20, which is just beginning, brings up a pattern-

bar which it is desired to repeat. A roll on the bar lifts lever 28, which, through link 31 and bell-crank lever 30 32, slides pin-wheel 34 into engagement with its star-wheel 37. On the succeeding revolution star-wheel 37 and the auxiliary pattern-barrel 41 will be turned one space, bringing a roll under lever 42, which, through link 44 and bell-crank lever 45 46, slides pin-wheel 20 out of engagement with its star-wheel 22, so that the revolution is completed without moving the main pattern-barrel 26. The main pattern-barrel 26 will continue to rest and the auxiliary pattern-barrel to run as long as each succeeding action of the auxiliary pattern-surface pin-wheel 34 brings up a roll under lever 42. The desired number of rests having been reached, an empty bar is presented under lever 42, which allows spring 50 to slide the pin-wheel 20 into engagement with its star-wheel 22 in season to turn the main pattern-barrel 26 on the same revolution, when the parts are returned to the position shown in the drawings, and the operation may be repeated.

When on the said Knowles loom it is desired to turn the harness-pattern indicators backward in the operation of picking out imperfect work or of finding the pick, the reverse key 8 is pulled out, reversing the motion of gear 4 on the harness-pattern shaft 3, and also that of gear 18 and pin-wheel shaft 19, so that the box-mechanism indicators, with no attention whatsoever from the operator, are always kept in time with the harness-indicators, no matter which way or for how many picks the harness-pattern mechanism is turned.

If the box-pattern mechanism were driven independently of the harness-pattern mechanism and it were left to the operator to keep count of the number of pattern-bars reversed, or even to reverse independently the box-pattern mechanism whenever the harness-pattern mechanism was reversed, the operator would easily get confused and get the two pattern mechanisms out of time with each other, thus putting the wrong filling in the shed.

Instead of connecting-gears 18 and 7 on the said Knowles loom, as shown in Fig. 3, I could connect gears 18 and 4 with equal facility; but sometimes on said loom the gear 4 is replaced by a star-wheel similar to star-wheels 20 and 34, and its pin-wheel is driven by the set of reverse gears, as shown by my Patent No. 399,328.

In any loom I could drive the pin-wheel shaft properly by gearing it directly to the harness-pattern shaft, in such proportion that the revolution of the harness-pattern shaft through the angular space between two contiguous bars would drive the pin-wheel shaft through a complete revolution, as shown by dotted lines 55, Fig. 1. The motion is somewhat easier geared from the reverse pinions, and on said Knowles loom I prefer that construction.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a loom, the combination, with the harness-pattern mechanism, of the repeating box-pattern mechanism driven from the harness-pattern mechanism, and consisting of the main and auxiliary star-wheels, sleeves, and pattern-barrels, pin-wheels, pin-wheel-operating levers, lever-retracting springs, connecting-links, and indicator-levers, substantially as and for the purpose stated.

2. In a loom, the main and auxiliary box-pattern indicators, star-wheels, star-wheel sleeves and pattern-barrels, pin-wheels, pin-wheel-operating levers, pin-wheel-lever-retracting springs, connecting-links, and indicator-levers, so arranged that indications on the main and auxiliary box-pattern indicators reciprocally control the times of action of the opposite pin-wheels upon their respective star-wheels, in combination with the pin-wheel shaft, its gear, the reverse gears of the harness-pattern mechanism, and shaft, substantially as described, and for the purpose set forth.

3. In a loom, the main and auxiliary box-pattern indicators, star-wheels, star-wheel sleeves and pattern-barrels, pin-wheels, pin-wheel-operating levers, pin-wheel-lever-retracting springs, connecting-links, and indicator-levers arranged so that indications on the main and auxiliary box-pattern indicators reciprocally control the times of action of the opposite pin-wheels upon their respective star-wheels, in combination with the pin-wheel shaft, the harness-pattern shaft, and intermediate connections for actuating the pin-wheel shaft from the harness-pattern shaft, substantially as set forth.

GEORGE F. HUTCHINS.

Witnesses:

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HENRY H. YOUNG.