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PATENTED APR. 9, 1907.

W. KAHRE.
BOX LOOM.

APPLICATION FILED APR. 14, 1905.

3 SHEETS—SHEET 1.

Fig. 3.

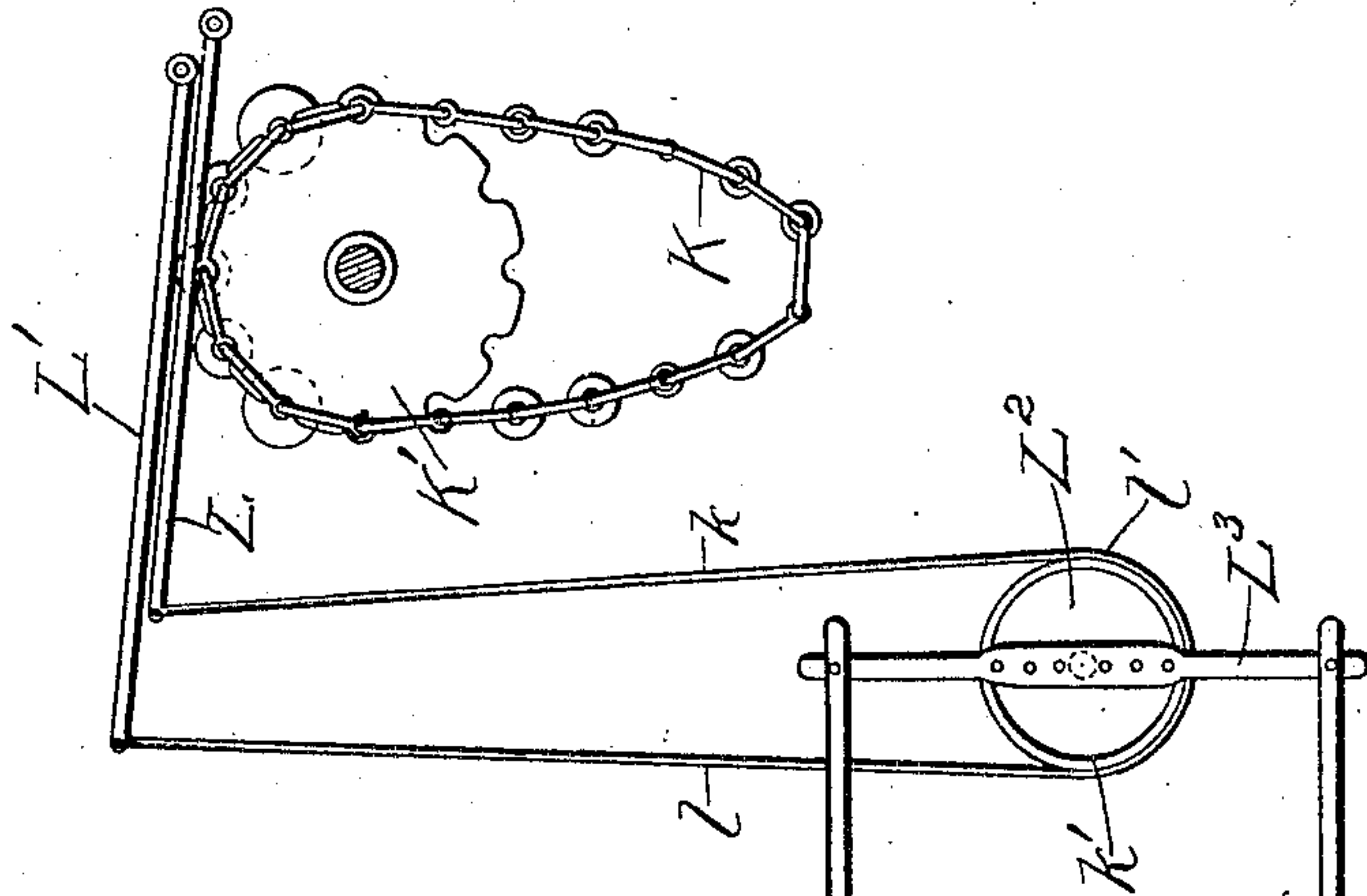
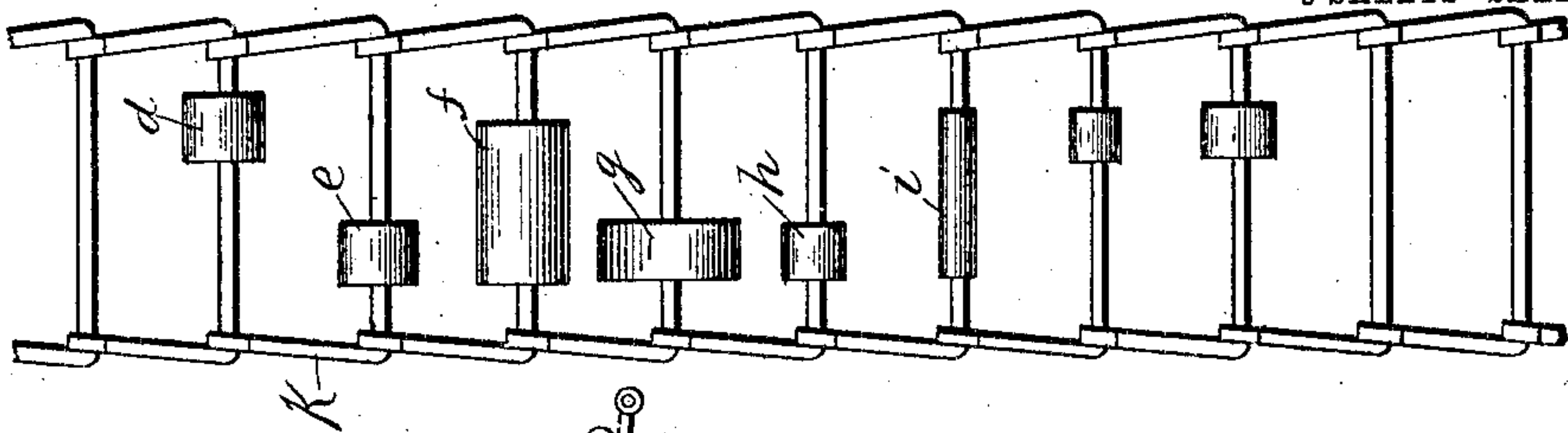
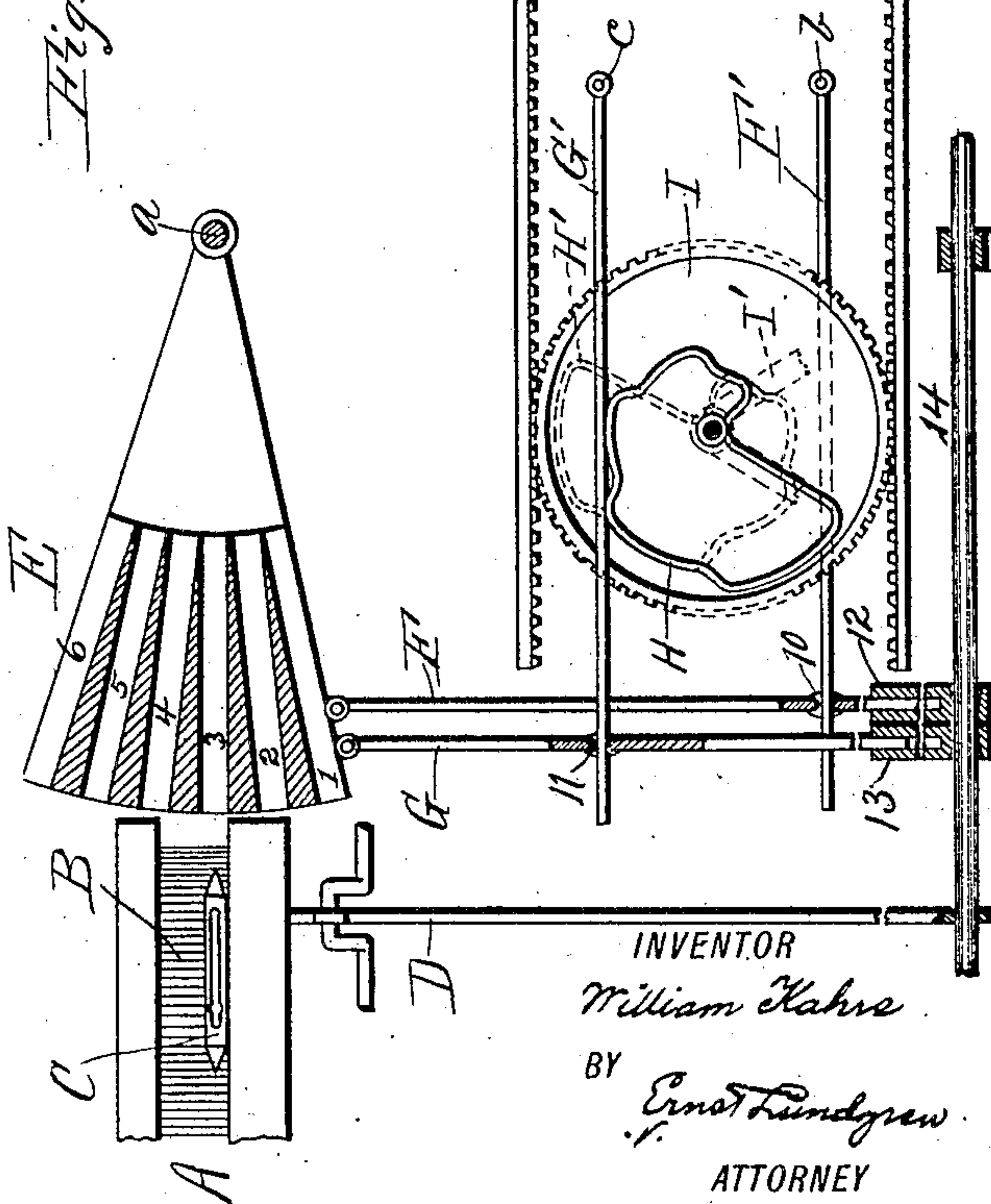


Fig. 1.



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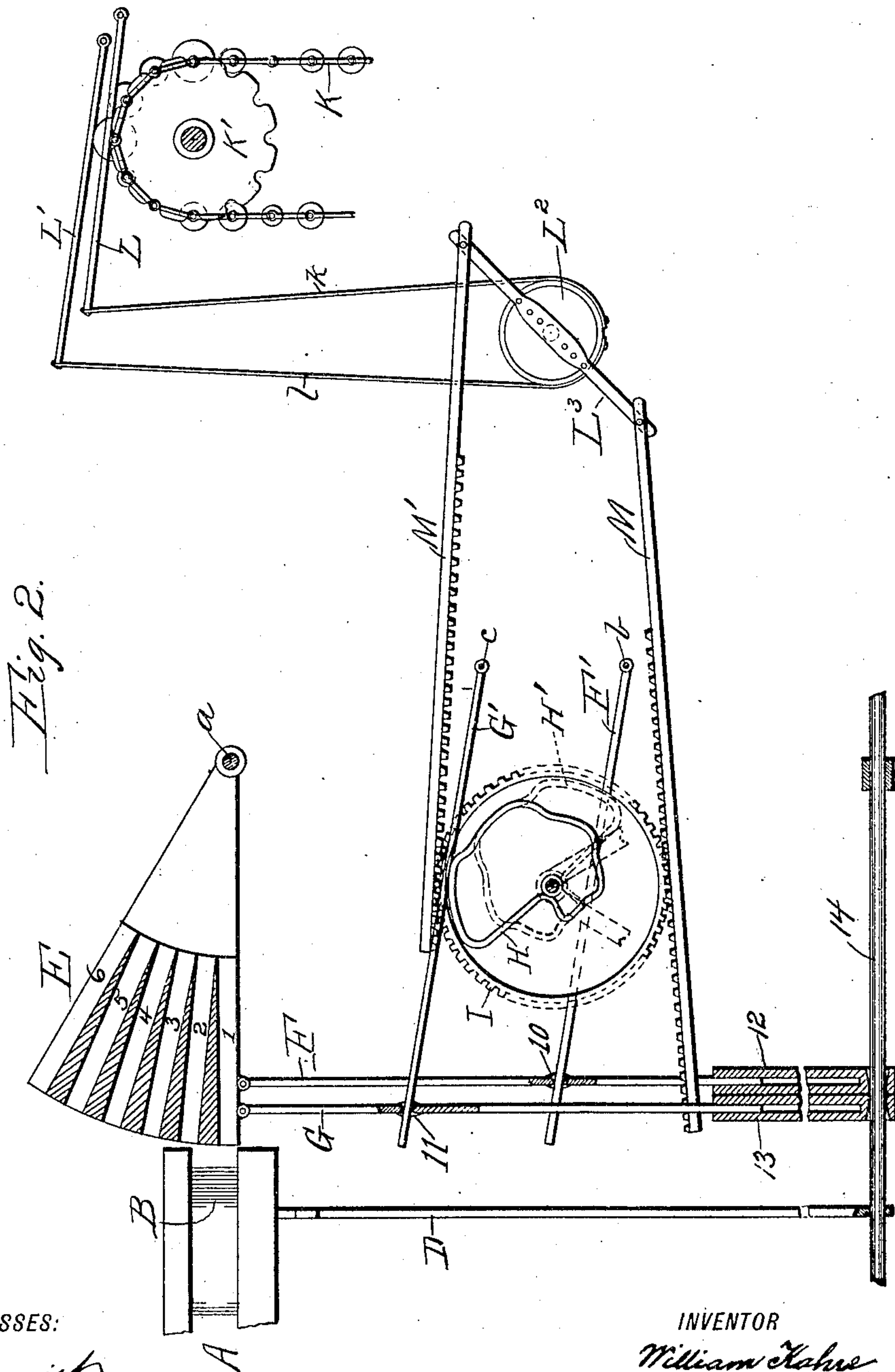
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3 SHEETS—SHEET 2.



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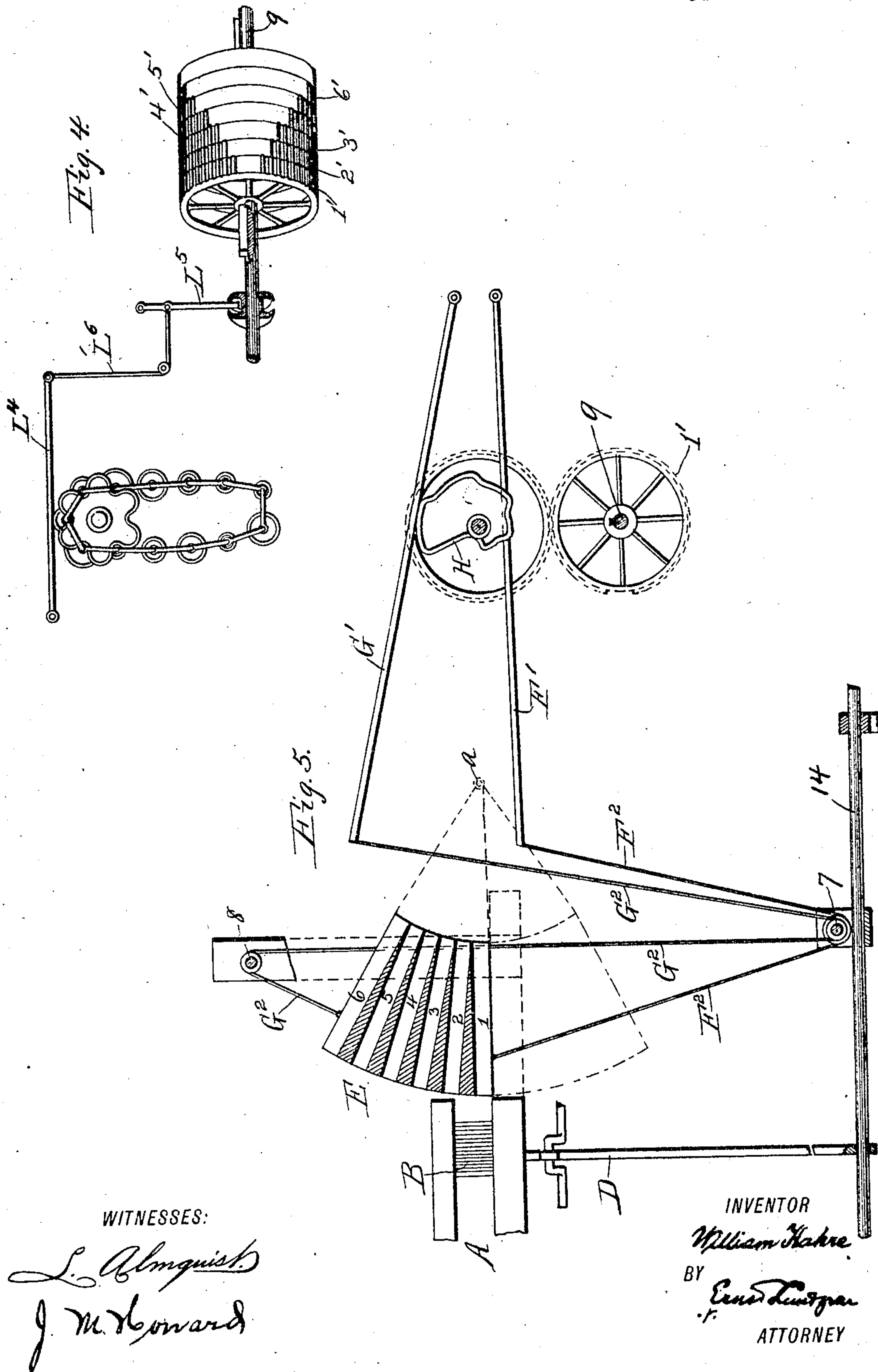
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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

WILLIAM KAHRE, OF WHARTON, NEW JERSEY.

BOX-LOOM.

No. 849,479.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed April 14, 1905. Serial No. 255,476.

To all whom it may concern:

Be it known that I, WILLIAM KAHRE, a citizen of the United States, residing at Wharton, in the county of Morris and State of New Jersey, have invented certain new and useful Improvements in Box-Looms, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact specification, sufficient to enable others skilled in the art to make and use my invention.

This invention has relation to that variety of looms wherein provision is made for the employment of any one of a series of shuttles which are by suitable means capable of being brought into position for action, which looms are ordinarily called "box-looms" from the fact that the series of shuttles are located in a box having compartments to accommodate them and made movable, so as to bring the path of any one of the shuttles opposite the shuttle-raceway of the loom. Heretofore in looms of this variety the box with the shuttle-compartments has been made vertically adjustable opposite the open end of the shuttle-raceway, and in other forms it has been proposed to make the box in the form of a rotating cylinder with shuttle-compartments located in the direction of its axis.

The principal object of my present invention is to provide or produce a shuttle-box in the general form of a sector, with the passages therein for the shuttles so arranged that their bottom lines will correspond with the radii of the circle and the box be made movable for the necessary distance around the center of this circle.

Subordinate objects are to provide simple, reliable, and efficient mechanical means for automatically moving the box at the time and to the degree required, this automatic means being regulated as to time, extent, or degree and rapidity by a suitable pattern-chain.

To accomplish the above-named objects and to secure other and further advantages in the matters of construction, operation, and use, my improvements involve certain novel and useful relative arrangements or combinations of parts, peculiarities of construction, and principles of operation, all of which will be herein first fully described and then pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a view in elevation and partial section, showing a

box-loom constructed and arranged for operation in accordance with my invention and involving my improvements, the detailed construction of the lay being omitted as unnecessary and the operating parts being shown in line with the lay for convenience of illustration. Fig. 2 is a view similar to Fig. 1, showing a different position of the shuttle-box and the operating mechanism therefor. Fig. 3 is a side view showing the pattern-chain enlarged. Fig. 4 is a side elevation showing a series of mutilated wheels mounted upon a shaft and means for adjusting the series of mutilated wheels through the medium of the pattern-chain for the purpose of actuating the cam-wheel under a modified form of mechanism for moving the shuttle-box. Fig. 5 is an elevation and partial section showing a modified means of connecting the operating-levers with my improved form of shuttle-box and a modified means of controlling the cam-wheel by employment of the mutilated wheels of Fig. 4 instead of the mechanism shown in Figs. 1 and 2.

In all the figures like letters of reference wherever they occur indicate corresponding parts.

A represents the shuttle-race of any loom, B the usual reeds employed therein, and C a loom-shuttle.

D is one of the swords on which the raceway is supported and which is mounted after the usual manner on a lay rock-shaft.

It has not been deemed necessary to illustrate the picker-staves or other mechanism by which the shuttle is caused to travel back and forth through the race and through the shuttle-box, as these are well-known adjuncts of the lay.

E is my improved form of shuttle-box. As indicated, it is in the general form of a sector or in fan shape and contains any desired number of compartments or passages for shuttles. These passages or compartments are numbered 1, 2, 3, 4, 5, and 6 in the drawings; but they may be of a less or a greater number, as may be preferred. As indicated, these passages are formed in a particular way—that is, the central bottom line of each coincides with a radius of the circle, and the top of the compartment or passage is parallel with the bottom, so that the several compartments are separated by wedge-shape partitions. The box is compelled to move about the center of its circle, as at *a*, either by confining the box thereon on a suitable

shaft or otherwise constraining the movements of the box, so that its circular front face, no matter to what position it may be adjusted, shall move accurately and always
5 near to the adjacent end of the raceway.

The shuttle which is in operation moves into its proper compartment, from whence it is driven back to the other end of the shuttle-race, the shuttles which are not in action being
10 contained in their respective compartments ready to be brought into action as may be required. In addition to its travel around the center point *a* the box *E* is also compelled to move about a line in continuation of
15 the axis of the lay-shaft.

For accomplishing the vertical movements of the box *E* it is supplied with or mounted upon rods *F G*, and these are operated by levers *F' G'*, pivoted at one end, as at *b c*. The
20 levers *F'* and *G'* are moved by suitable cams *H* and *H'*, these cams being so cut and proportioned that when the levers are elevated to their extreme limit the compartment 1 will be located accurately opposite the shuttle-race, and when they are at the lowest point of
25 their travel the compartment 6 will occupy that position, and so also the cams are cut and proportioned to bring the intermediate compartments separately to the desired position. The two levers being connected with
30 the box, when one is forced up or down by its corresponding cam the other is compelled to follow, as will be readily understood. The two cams are mounted upon a suitable cam
35 gear-wheel *I*, supported in suitable standards, as at *I'*, and the movements of this gear-wheel determine the position of the shuttle-box.

K is a pattern-chain mounted upon a pattern-chain wheel *K'*, which is to be turned
40 after the manner of any ordinary pattern-chain wheel. The pattern-chain is supplied with rollers, as *d e f g h i*, &c., these rollers being of different sizes and different lengths,
45 according to the desired pattern to be woven, and located in different positions on the links of the chain, as may be required by the pattern.

The preferred manner of operating the
50 cam gear-wheel *I* is illustrated in Figs. 1 and 2. Two levers *L L'*, pivoted at one end, are located in position to be raised when struck by the rolls *d e f*, &c., and the free ends of these levers are connected by cords or cables
55 *k l* with a pulley *L²*, one of the cords *k* reaching around to a point, as at *k'*, and the other, *l*, to a point, as *l'*, so that whichever of these cords is elevated it will suffice to turn the pulley *L²* in the proper direction and to the
60 proper degree, determined by the size and location of the rolls or blocks on the pattern-chain.

Affixed to the pulley *L²* and movable therewith is a bar *L³*, to the ends of which are piv-

oted rods *M M'*, which carry racks for engagement with the cam gear-wheel *I*.

From the arrangement shown it will be apparent that when the racks *M M'* are moved the cam gear-wheel *I* is turned in a corresponding direction and to a corresponding
70 extent to bring the shuttle-box to the proper location.

Other means of moving the shuttle-box may be adopted, as must be apparent. Figs. 4 and 5 show another means differing from
75 the first in details, but not in principle. In Fig. 5 the levers *F'* and *G'* are connected with the shuttle-box by means of cords or cables *F² G²*, leading under a pulley, as 7, one being carried up and connected with the bottom
80 of the shuttle-box and the other being carried up and over a pulley 8 and thence down and connected with the top of the shuttle-box. The two levers *F'* and *G'* are moved by the cams *H* and *H'*, as in previous figures;
85 but the cam gear-wheel instead of being moved by rods carrying racks is actuated by one of a series of gear-wheels *1' 2' 3' 4' 5' 6'*, according to which one is brought into mesh with the cam gear-wheel. The said gears
90 *1' 2' 3'*, &c., are mounted upon an adjustable shaft 9, and each of these gears is mutilated or has some of its teeth omitted, as indicated, so as to turn the gear-wheel on which or in
95 connection with which the cam is mounted only so far as is permitted by their unmutilated portion. When the mutilated portions are brought around to the proper point, then
100 of course the gear-wheel connected with the cam will not be moved. The position of the cluster of mutilated gears is determined by the pattern-chain, the pivoted lever *L⁴* being located and arranged to be moved by the
105 blocks or rolls on the pattern-chain and being connected with a shifting-lever *L⁵* through the medium of a cord or cable *L⁶*, the shifting-lever *L⁵* being adapted to move the adjustable shaft 9 and the cluster of gears thereon. When any block on the pattern-chain elevates the lever *L⁴*, the effect will be to move
110 the shaft 9 so as to bring the corresponding mutilated gear—as, for instance, *1'*—to a position to operate in connection with the cam gear-wheel. This cam gear-wheel is then turned, and of course the cam with it,
115 until the mutilated portion comes adjacent to the cam gear-wheel, when movement of the latter ceases. Then the cam is turned to the position which lifts the levers *F'* and *G'* to the desired points, bringing the corresponding opening in the shuttle-box opposite
120 the raceway. The next block on the pattern-chain will in like manner determine which of the mutilated gears is to be brought into operative relation with respect to the
125 cam gear-wheel, and thus determine which of the openings in the shuttle-box is to be brought opposite the raceway. Thus it will

be seen that the effect of this arrangement is the same as the effect of the arrangement shown in previous figures.

In Fig. 4 the lever L^4 is shown in its lowest position and the lever L^5 in vertical position. The pattern-chain elevates the lever L^4 to its next position, and the weight of this lever will cause it to return to a lower position when so required. As lever L^4 is raised it causes lever L^5 to swing from the vertical position, and this lever is returned to any more nearly vertical position by its own weight (which may be assisted by any mechanical means, if necessary) and carries the mutilated wheels $1' 2'$, &c., back from the point to which they had been previously adjusted. The mutilated wheels are shifted in either direction from one working position to the next succeeding working position.

When the rods F and G are employed, they are connected with the levers F' and G' by loose joints, as at 10 and 11, so as to permit the necessary movements of the said rods without interference with the necessary movements of the levers. The rods F and G in carrying the shuttle-box E up or down must also partake of a slight motion around the center a , and as it is necessary that the shuttle-box E should conform also with the movements of the shuttle-race the lower ends of these rods are mounted in tubes or sockets, as at 12 and 13, within which they slide up and down, which sockets are in turn mounted so that they may move in the required manner in respect to the line of the axis of the lay-shaft. In the form shown the lay-shaft is represented as prolonged, as at 14, and on this prolongation the sockets 12 and 13 are mounted so as to easily move on the shaft in the manner and to the degree that may be necessary. Any other suitable manner of mounting and securing the rods F and G may be adopted, it being only necessary that they shall operate easily and accurately to secure the desired movements of the shuttle-box. The particular construction and arrangement indicated is by way of example and is the simplest means that I have devised.

When the flexible connections F^2 and G^2 are employed, they conform to the movements of the shuttle-box by reason of their inherent flexibility, and thus obviate the use of the particular joints required when the rods are employed. In this arrangement, however, I deem it advisable to mount the pulley 7 on the prolongation of the lay-shaft and permit it to move slightly thereon as the

shuttle-box travels with the raceway in order that any possible binding or cramping of the flexible connections may be avoided by which the accuracy of the movements of the shuttle-box might be impaired.

The improvements being constructed and arranged for operation substantially in accordance with the foregoing explanations will be found to answer all the purposes or objects of the invention herein alluded to.

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

1. In a box-loom, the combination with the shuttle-race, a lay rock-shaft and a pattern-chain, of a shuttle-box in the form of a sector, the circular front of said shuttle-box being movable near to the end of the shuttle-race, and rods for moving the said box about the center of the circle of which it forms a part, the movements being determined by the pattern-chain and the said rods being mounted upon the lay rock-shaft, substantially as and for the purposes set forth.

2. The combination with the shuttle-box in the form of a sector and a pattern-chain, of pivoted levers for compelling the movement of said box, cams for moving said levers, a cam gear-wheel, and means for connecting the latter with the pattern-chain, substantially as shown and described.

3. In a box-loom, the combination of a shuttle-box in the form of a sector, pivoted levers, rods connecting the box with the levers, cams for moving said levers, a cam gear-wheel, racks for turning said wheel, a pulley connected with the said racks, a pattern-chain, levers movable by contact with the pattern-chain, and flexible connections leading from said levers to the pulley connected with the racks, substantially as and for the purposes set forth.

4. The combination with the shuttle-box in the form of a sector, a pattern-chain, pivoted levers, cams for moving said levers, means for connecting the cams and the pattern-chain, and means for connecting the levers and the box, the latter means being movable with respect to the lay rock-shaft, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM KAHRE.

Witnesses:

C. SEDGWICK,
J. M. HOWARD.