(No Model.) 3 Sheets—Sheet 1.

G. T. RIGUEL.

FEATHERING PADDLE WHEEL.

No. 479,528. Patented July 26, 1892.

Fig. 1

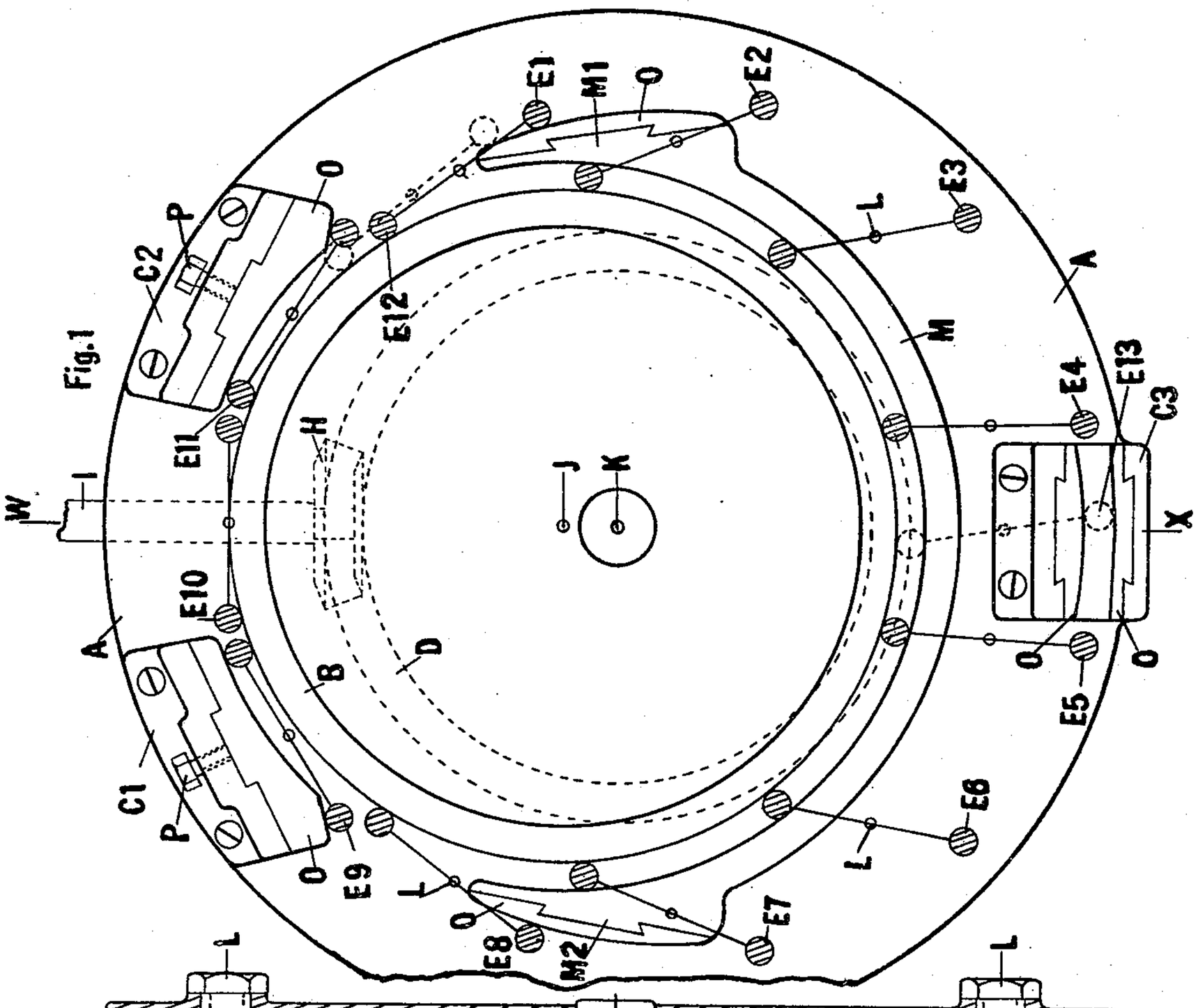
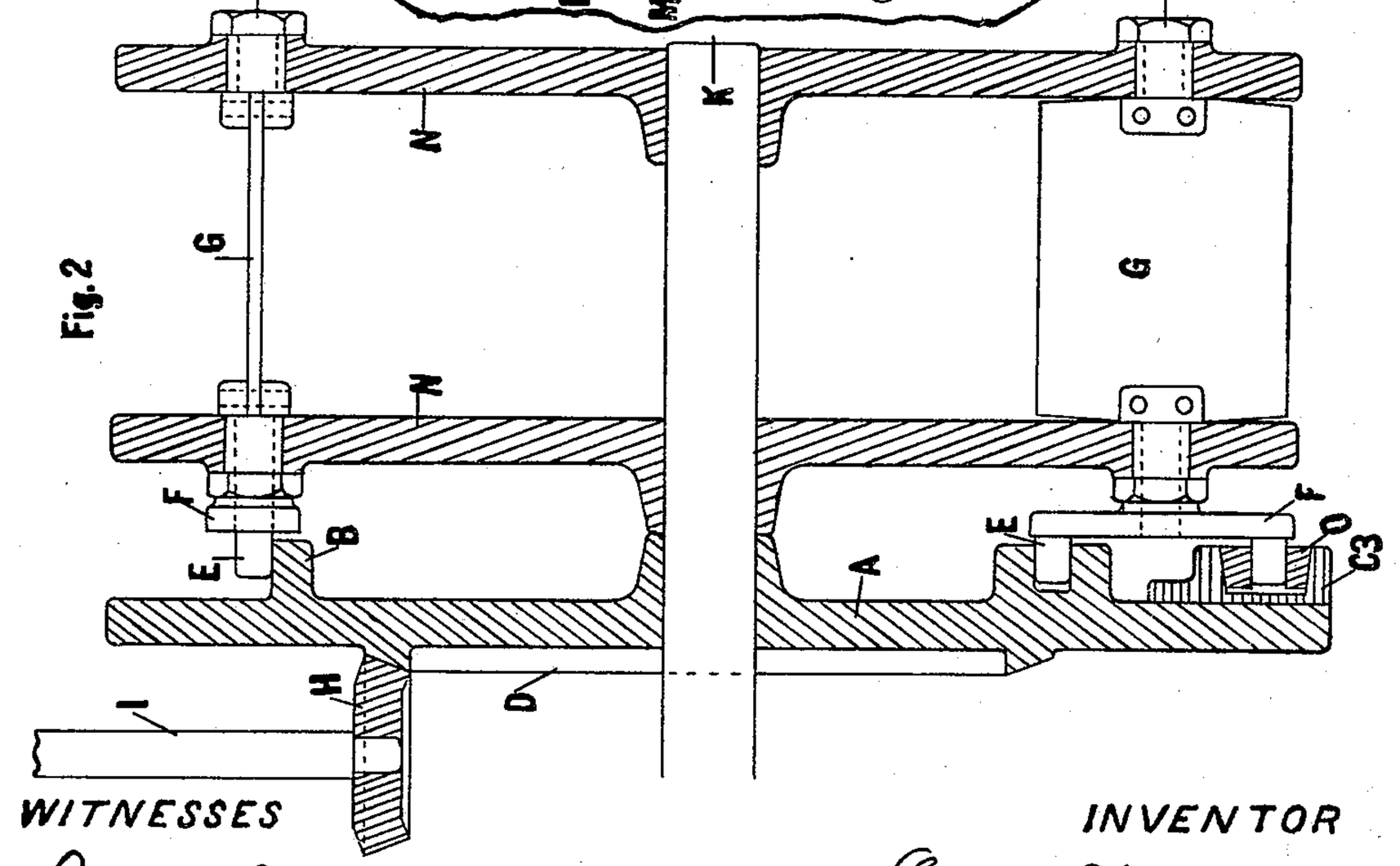


Fig. 2



WITNESSES

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A. O. Hanes

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(No Model.)

3 Sheets—Sheet 2.

G. T. RIGUEL.

FEATHERING PADDLE WHEEL.

No. 479,528. Patented July 26, 1892.

Fig.3

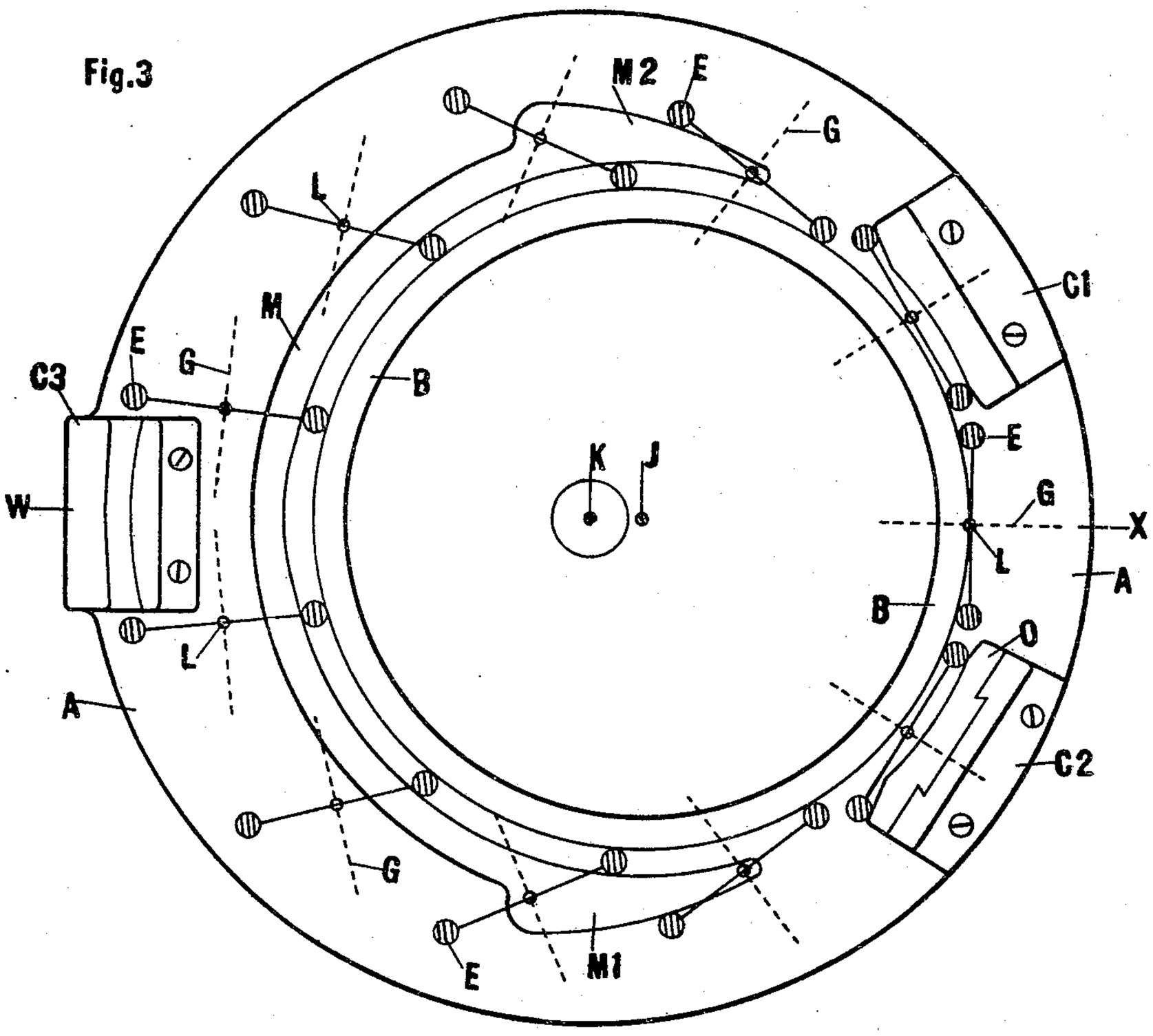


Fig.4

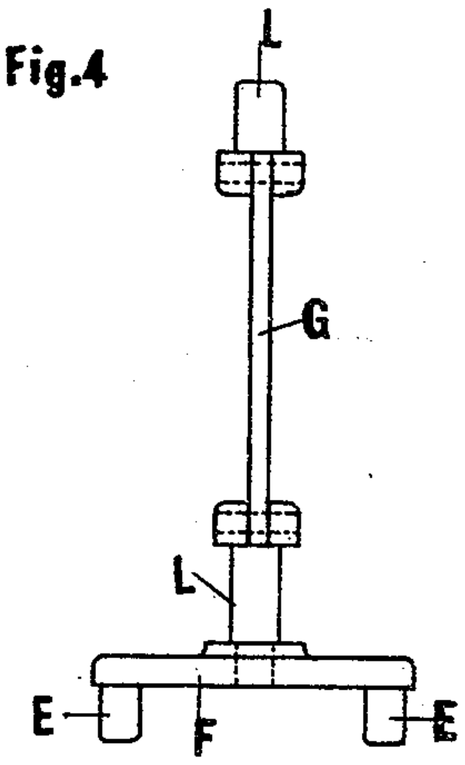
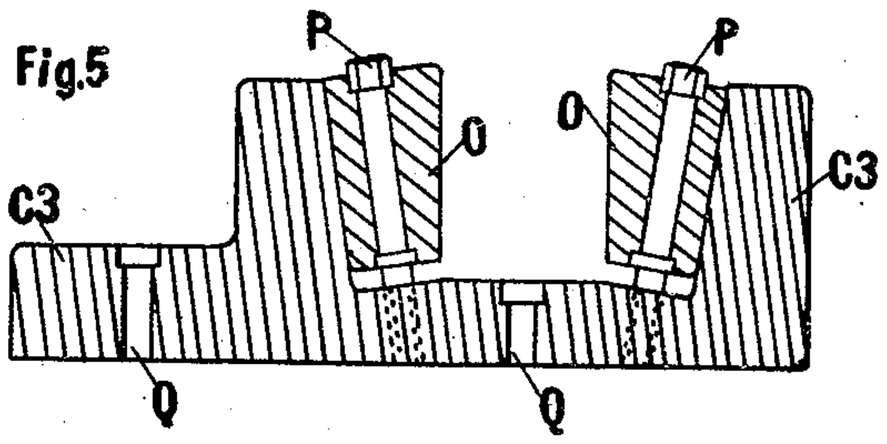


Fig.5



WITNESSES

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(No Model.) 3 Sheets—Sheet. 3.

G. T. RIGUEL.

FEATHERING PADDLE WHEEL.

No. 479,528. Patented July 26, 1892.

Fig. 6

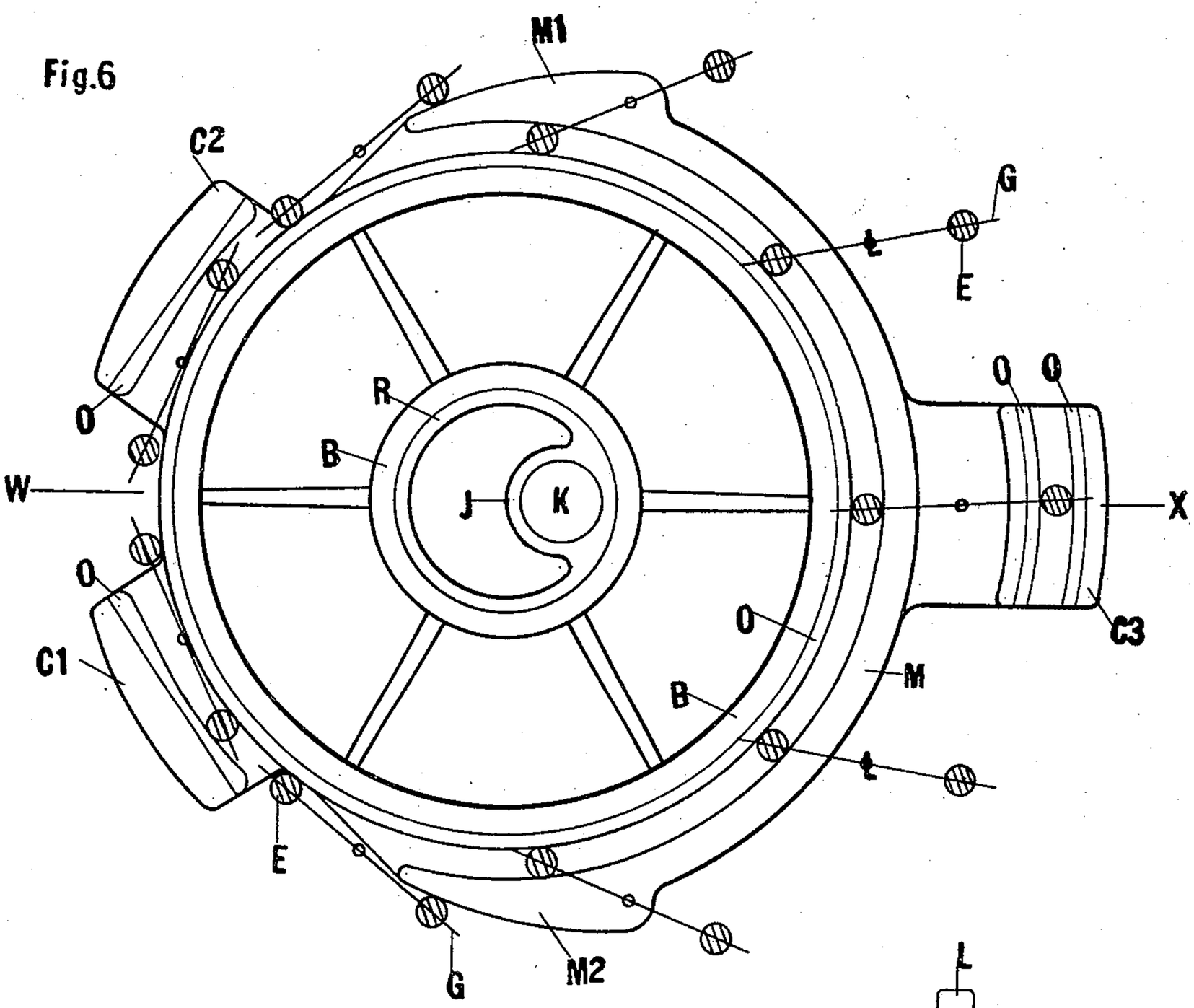
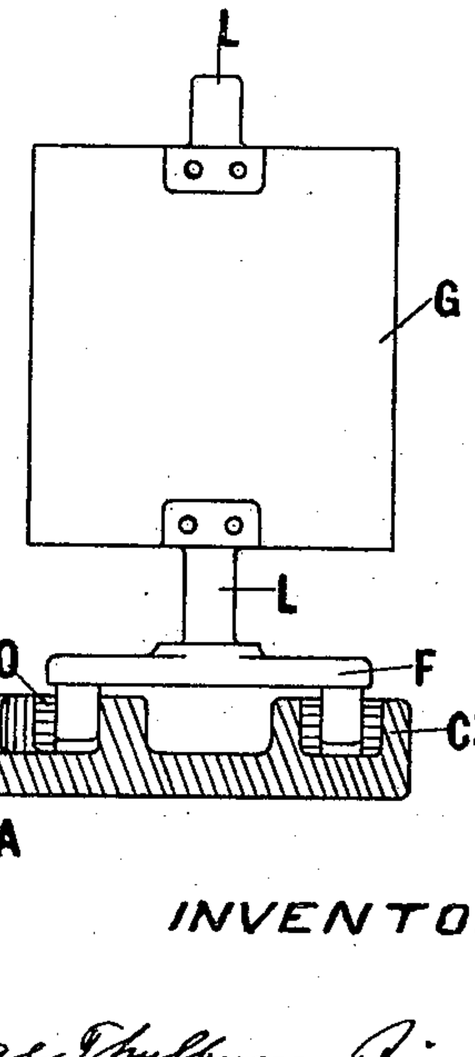
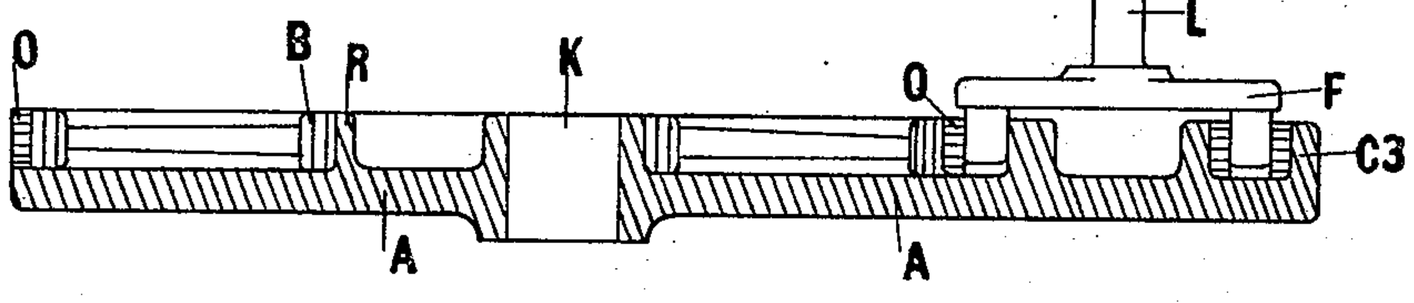


Fig. 7





WITNESSES

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INVENTOR

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UNITED STATES PATENT OFFICE.

GEORGE THULBURN RIGUEL, OF PLAINFIELD, NEW JERSEY.

FEATHERING PADDLE-WHEEL.

SPECIFICATION forming part of Letters Patent No. 479,528, dated July 26, 1892.

Application filed October 14, 1891. Serial No. 408,713. (No model.)

To all whom it may concern:

Be it known that I, GEORGE THULBURN RIGUEL, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented a new and useful Feathering Paddle-Wheel, of which the following is a specification.

My invention consists in arranging the vanes or paddles by a system of guides, cranks, pins, or rollers, or both pins and rollers, so that if entirely submerged in a flowing medium a rotative action will occur on three sides of the wheel, tending to turn it in one direction, the vanes on the other side of the wheel being more or less parallel with the flow; or if partly or entirely submerged in a medium in a state of rest a flowing motion will be given to the medium when the shaft or axis is rotated upon which the wheel is fastened. The movements given to the vanes or paddles are not entirely new, chains and gears having been used or proposed to obtain approximately the same movements of the vanes or paddles.

The advantages which I claim for my invention are less liability to derangement and ease of movement of the vanes or paddles.

In the drawings, Figure 1 is an elevation and Fig. 2 is a section. Fig. 3 is a view showing the positions of the vanes or paddles when they are fastened at right angles to the cranks and the positions of the guides reversed. Fig. 4 is an elevation of a vane or paddle and crank as used in Fig. 3. Fig. 5 is a sectional view of the guides C^3 of Fig. 1, showing the facing O and a method of adjustment for the facings. Fig. 6 is a plan view of a wheel where the width of the vanes exceeds the length of the cranks. Fig. 7 is a section through W X of Fig. 6 with a crank and vane or paddle in elevation as used in Fig. 6.

Figs. 1 and 2 show the principles of my invention quite fully, the other views being modifications adapted to special uses.

In Fig. 1, A is a guide plate or support, on which are formed or fastened the main guide B and the auxiliary guides C', C^2, C^3, M, M', and M^2, M' and M^2 being the compounded ends of M. The axis of the main guide B is at J. Eccentric to J is axis K, common to guide-support A and the wheel. On the opposite side of A there is formed or fastened a rack or gear D with axis at K. Gear H gears with D and is fastened to shaft I. It follows that by turning shaft I from the wheel-house guide-support A will revolve with the guides. The sections E' E^2 E^3, &c., are sections of pins or rollers, or both pins and rollers, which are secured to the ends of double cranks F. (Shown in Figs. 2 and 4.) The sections are connected with simple straight lines to enable the eye to keep them in pairs and show the positions of the vanes or paddles when fastened parallel with the cranks. At the center of the straight lines are small circles to represent the central axis L, common to vane and crank. The cranks are fastened to the vanes or paddles and the action is as follows: At point X the vane or paddle E^4 will be at a right angle with the lines of resistance; but if while passing point X the vane or paddle should strike a solid substance at its outer edge the pin or roller in the guide-course might lag behind and cause the vane or paddle to offer a decided resistance to the revolution of the wheel, as the angle of the vane or paddle to the lines of resistance would be wrong. Guide C^3 is placed here to prevent such an occurrence of the vanes or paddles, and will be adjusted so as to slightly tip the crank and vane while passing point X, as shown by the skeleton figure E^{13}. Guide M may be slightly hollowed at this point, as shown at point W in Fig. 3, to allow for the tipping. After passing point X the vane and crank will assume the positions of E^5 E^6 E^7, &c., until it arrives at guide C^2. Here roller E^{11}, which has assumed the positions of E' E^2, &c., will be thrown inward by guide C^2 and the roller will then take the position of E^{12}, having made one-half of a revolution about axis L during one revolution of the wheel on axis K. If now shaft I be turned from the wheel-house, the relation of the vanes to the lines of resistance will be changed.

In the case of a current water-wheel, if the rotation of shaft I be discontinued midway between points W and X the vanes will be nearly parallel with the flow and the wheel will stop. If the rotation of shaft I be continued until point X occupies the position of point W, the motion of the wheel will be reversed or will continue in the same direction with a change of tide.

In the case of a paddle-wheel shaft I may be used to reverse the wheel instead of reversing the engine, as is usual. The revolution of guide-support A thus forms a means for regulating, stopping, or reversing the wheel; but instead of shaft I and gears H and D guide-support A may be moved by hydraulic or other suitable arrangements. When used as a paddle-wheel, guide plate or support A may be fastened to the vessel, the reversing being done with the engine and shaft I, gears H and D omitted, as shown in Figs. 3 and 6.

Reference-letters O indicate separate removable facings on the guides, which may be adjusted in any suitable manner, the facings shown on C′ and C^2 being adjusted by screws P. The facings may be made of any material suitable to the use for which the wheels are used. Theoretically the facings are not necessary for the movement of the vanes or paddles, and in case of current water-wheels, where the motion is slow and the guides constantly lubricated, the guides may be made without separate facings, as C′ and C^3 in Fig. 3. Where the motion will be rapid, as in paddle-wheels and propellers for air-boats, I believe the facings and adjustability will be a necessity for practical and economic working.

In Fig. 3 the heavy dotted lines G represent the vanes or paddles. I believe this arrangement is better adapted to the purposes of a paddle-wheel than the arrangement of Fig. 1, as the water has a better chance for a rapid passage through the wheel with the same number of vanes or paddles as Fig. 1.

Fig. 6 is a plan view of a wheel where the width of the vanes exceeds the length of the cranks and which may be desirable in windmills and air-propellers. Guide B is shown with a facing O, and the guide is revoluble about its axis J, either by the friction of the pins or rollers E, or it may be driven from axis K. By this means the wear of the pins or rollers is greatly reduced and they will also run smoother. The guide is provided with arms, and in case of small wheels may be made quite light.

R is an eccentric, which forms the axis upon which B revolves and may be formed on support A, as shown, or in case of large wheels may be made separate and fastened on A.

I am aware that the buckets in water and paddle wheels have been pivoted and in some cases their positions have been regulated by crank-arms in slots. In my improvements there are two crank-pins to each bucket and they are rotated upon their pivots a half-revolution each revolution of the wheel upon its axis, and the buckets are held firmly in their various positions by such crank-pins.

I claim as my invention—

1. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with a pivot of each bucket and two crank-pins near the ends of such arm, and a cam-slot eccentric to the axis of the wheel, receiving the respective crank-pins, such slot being open at one side and provided with stationary auxiliary guides for moving the respective crank-pins out of and into such eccentric slot, substantially as specified.

2. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with a pivot of each bucket and two crank-pins near the ends of such arm, a cam-slot eccentric to the axis of the wheel, receiving the respective crank-pins, such slot being open at one side and provided with stationary auxiliary guides C′ C^2 for moving the respective crank-pins out of and into such eccentric slot, and the guiding-cam C^3, substantially as specified.

3. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with the pivot of each bucket and two crank-pins near the ends of such arm, a cam-slot eccentric to the axis of the wheel, which slot receives the respective crank-pins and is open at one side, and stationary auxiliary guides having separate removable faces for moving the respective crank-pins as they pass out of and into the eccentric slot, substantially as specified.

4. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with the pivot of each bucket and two crank-pins near the ends of such arm, a cam-slot eccentric to the axis of the wheel, which slot receives the respective crank-pins and is open at one side, stationary auxiliary guides having adjusting-screws, and separate removable faces for moving the respective crank-pins as they pass out of and into the eccentric slot, substantially as specified.

5. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with a pivot of each bucket and two crank-pins near the ends of such arm, a plate surrounding the wheel-shaft and having a cam-slot eccentric to the axis of the wheel, and mechanism for turning the plate and the parts carried by it, the slot receiving the respective crank-pins and being open at one side, and auxiliary guides connected to the plate and moving the respective crank-pins out of and into such eccentric slot, substantially as specified.

6. The combination, with the shaft and wheel, of buckets pivoted to the wheel and having their edges equidistant at each side of the pivots, a cross-arm connected with the pivot of each bucket and two crank-pins near the ends of such arm, a cam-slot eccentric to the axis of the wheel and having a removable facing at one side of the slot, the slot being open at one side, and auxiliary guides for moving the respective crank-pins out of

and into the eccentric slot, substantially as specified.

7. The combination, with the shaft and wheel, of buckets pivoted to the wheel, crank-arms connected with the buckets, and a plate having an eccentric cam-slot and a circular wheel, the periphery of which forms the inner side of the eccentric cam-slot, substantially as set forth.

GEORGE THULBURN RIGUEL.

Witnesses:
GEORGE W. DEMEZER,
H. O. HANCE.