Sept. 5, 1939. G. C. MICHAELSON ET AL 2,171,732

HYDROMOTOR

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Fig. 1.

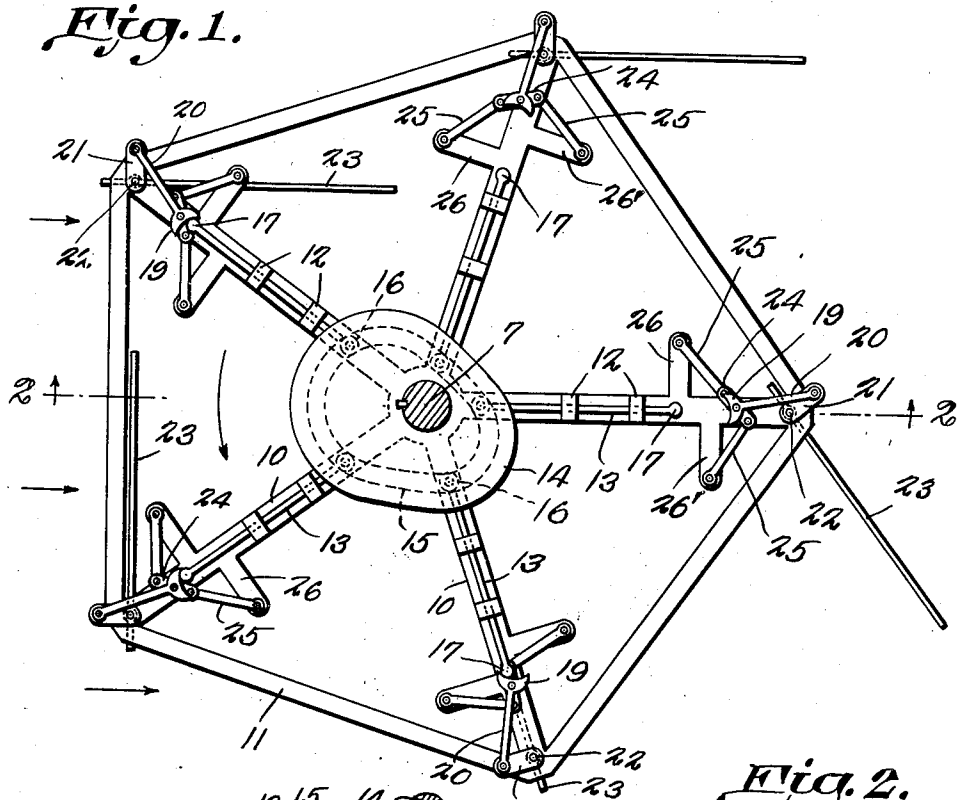
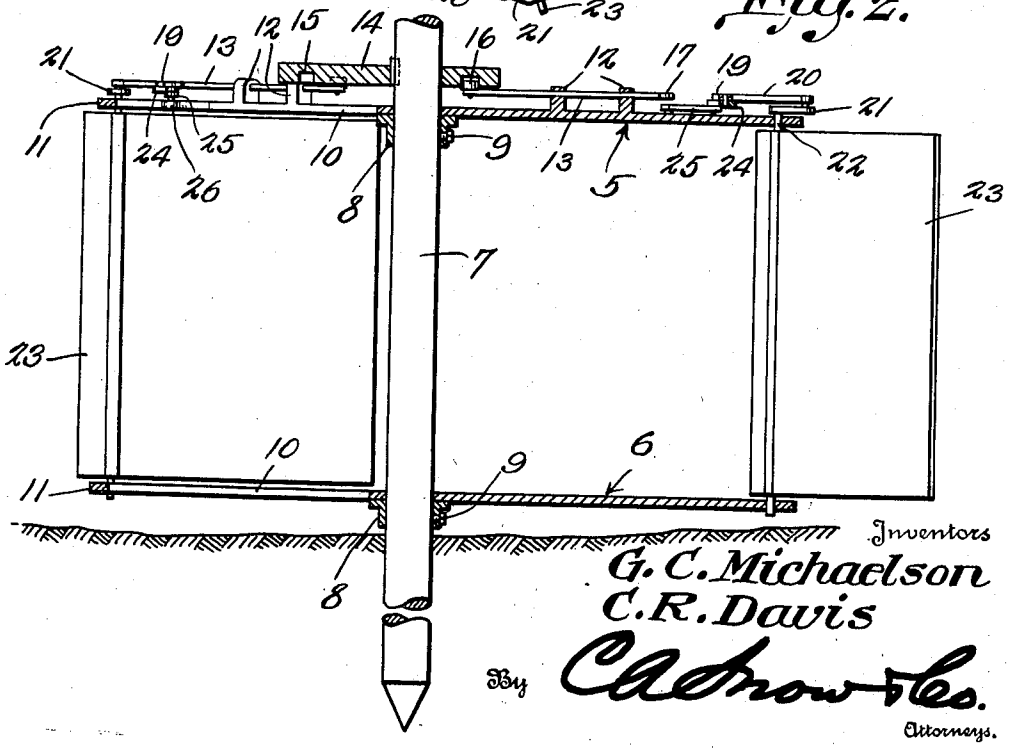


Fig. 2.



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Fig. 3.

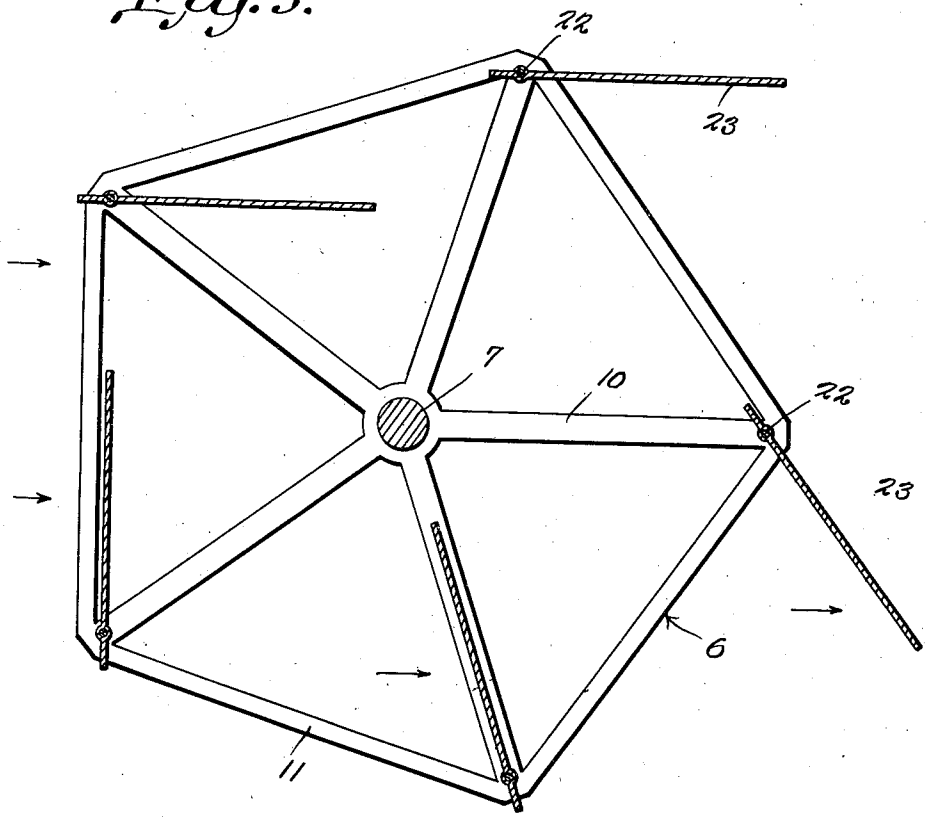
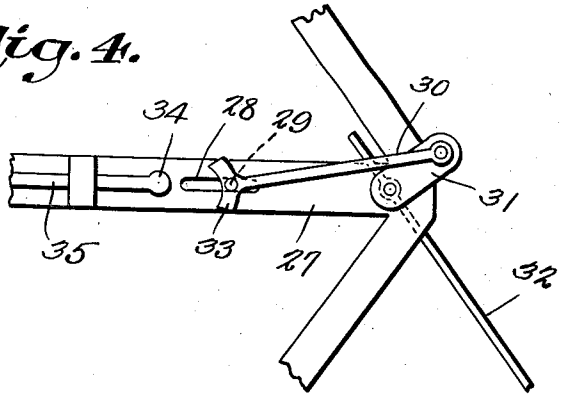


Fig. 4.



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UNITED STATES PATENT OFFICE

2,171,732

HYDROMOTOR

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Application September 29, 1936, Serial No. 103,174
Renewed January 17, 1939

3 Claims. (Cl. 170—149)

This invention relates to water motors, and particularly to water motors using water wheels having pivoted blades.

An important object of the invention is to provide a water wheel of this character which will maintain a given direction of rotation.

Another object of the invention is to provide an operating mechanism for controlling the operation of the blades of the water wheel, whereby the blades are automatically released and allowed to feather throughout a portion of the cycle of rotation of the water wheel, thereby eliminating resistance offered by the blades when moving from their active or power positions, to their inactive positions.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

Referring to the drawings:

Figure 1 is a plan view of a water motor constructed in accordance with the invention.

Figure 2 is a sectional view taken on line 2—2 of Figure 1.

Figure 3 is a horizontal sectional view taken through the water motor.

Figure 4 is a fragmental view illustrating a modified form of push rod mounting.

Referring to the drawings in detail, the water wheel comprises an upper section 5 and a lower section 6, the sections 5 and 6 being spaced apart and mounted on the vertical shaft 7, formed with a pointed extremity whereby the shaft 7 may be driven into the bed of the stream in which the water wheel is positioned.

These sections 5 and 6 rest on the collars 8, which are adjustably mounted on the vertical shaft 7, and held in their positions of adjustment by means of the set screws 9. Thus it will be seen that due to this construction, the blades, mounted between the sections 5 and 6, and to be hereinafter more fully described, will be held in their active positions at all times.

Each of these sections embodies spokes 10 connected by the rim 11, the spokes of the upper section 5 being provided with bearings 12, through which the push rods 13 operate. Keyed to the shaft 7, at a point above the upper section 5, is a cam 14, the cam having a cam groove 15 formed in the under side thereof. Mounted on the inner ends of the push rods 13, are rollers 16, which rollers operate in the cam groove 15 of the cam 14.

The outer ends of the push rods 13 are formed with heads 17, the heads being designed to engage the curved surfaces of the members 19 of the connecting rods 20. The connecting rods 20 have their outer ends connected to the arms 21 which are secured to the shaft 22, on which the blades 23 are mounted, so that movement of the connecting rods, will produce a relative movement of the blades.

In order that the connecting rods 20 will be held in proper positions to be engaged by the heads 17 of the push rods 13, the curved members 19 are pivotally connected to the links 24, which in turn have pivotal connection with the links 25 that are pivotally connected at the outer ends of the arms 26 and 26' respectively extending from the opposite sides of the spokes of the upper section of the wheel as clearly shown by Figure 1 of the drawings, the arms 26 and 26' carried by each spoke 10, are different radial distances from the shaft 7, with the result that the oscillating arms 25 are exceptionally short, and the links 19 are maintained in a position directly in the line of travel of the wheel, insuring the feathering of the blades at the proper time, and consequently reducing drag or resistance to the minimum.

From the foregoing it will be seen that due to the construction of the cam 14 and cam groove 15, the push rods 13 are moved outwardly at the time when the sides faces of the blades 23 are presented to the force of the flow of the water, and that when the blades pass beyond a given point, the blades are released and allowed to feather with the further rotation of the wheel, thereby eliminating resistance offered by the blades moving to their inactive positions.

In the modified form of the invention as shown by Figure 4 of the drawings, a spoke of the upper section of the wheel is indicated by the reference character 27, and as shown, the spoke is provided with an elongated opening 28 in which the pin 29 operates, the pin 29, extending downwardly from the connecting rod 30 which in turn has pivotal connection with the arm 31 that is secured to the upper end of the shaft on which the blade 32 is mounted.

A curved member 33 is formed at the inner end of each connecting rod 30 in this form of the invention, the curved members 33 being designed to be engaged by the heads 34 of the push

rods **35**, associated therewith. Due to this construction, it will be seen that when the push rods **35** are moved outwardly so that the heads **34** thereof engage the curved inner surfaces of the members **33**, the connecting rods **30** will be held against movement. It will of course be obvious that when the connecting rods **30** are thus held against movement, the blades **32** are in position so that the side faces thereof are presented to the force of the flow of the water. As the water wheel moves past a predetermined point, these blades **32** are released to feather in the flow of the water, to the end that they do not offer resistance, as the wheel continues its rotation through the flow of water.

Having thus described the invention, what is claimed is:

1. A water motor embodying a shaft, a wheel mounted on the shaft and including spaced upper and lower sections, each section embodying spokes, arms extending laterally from each spoke, one of said arms of each spoke being of greater radial distance from the shaft than the adjacent arm of the spoke, links connected to the arms, pivoted links connecting the free ends of the first mentioned links, blades pivotally mounted between the sections, rods connected with the latter links, means for transmitting movement of the blades to the rods, and push rods on the upper section adapted to engage the inner ends of the arms for restricting movement of the arms and blades, so that the blades are held against pivotal movement, at predetermined intervals.

2. A water motor including a shaft, a wheel mounted on the shaft, upper and lower wheel sections mounted for rotary movement on the shaft, each section comprising spokes, arms extending from the spokes and disposed in the direction of rotation of the wheel, arms extending in directions opposite to the direction of rotation of the wheel and carried by the spokes, the latter arms being spaced greater radial distances from the shaft than the first mentioned arms, links pivotally connected to the free ends of the arms, links pivotally connected to the first mentioned links, rods having curved heads, pivotally connected with the latter links, blades having shafts, pivotally mounted between the sections of the wheel, arms connected with the shafts of the blades and to which the first mentioned arms are connected, push rods mounted on the spokes and adapted to engage the curved heads, so that the blades are periodically held against rotation, and means for reciprocating the push rods.

3. A water motor including a shaft, a wheel comprising spaced sections, blades having shafts, pivotally mounted between the sections, arms extending from the spokes and disposed in the direction of travel of the wheel, arms extending from the spokes and extending in directions opposite to the direction of rotation of the wheel, the last mentioned arms being disposed at points greater radial distances from the shaft than the first mentioned arms, substantially long links connected with the arms, pivoted links connecting the outer ends of the arms, rods connected with the arms of the blade shafts and connected with the pivoted links, said links and rods adapted to move with the blades, and reciprocating push rods mounted on the spokes and adapted to move to restrict movement of the links, rods and blades, at predetermined intervals.

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