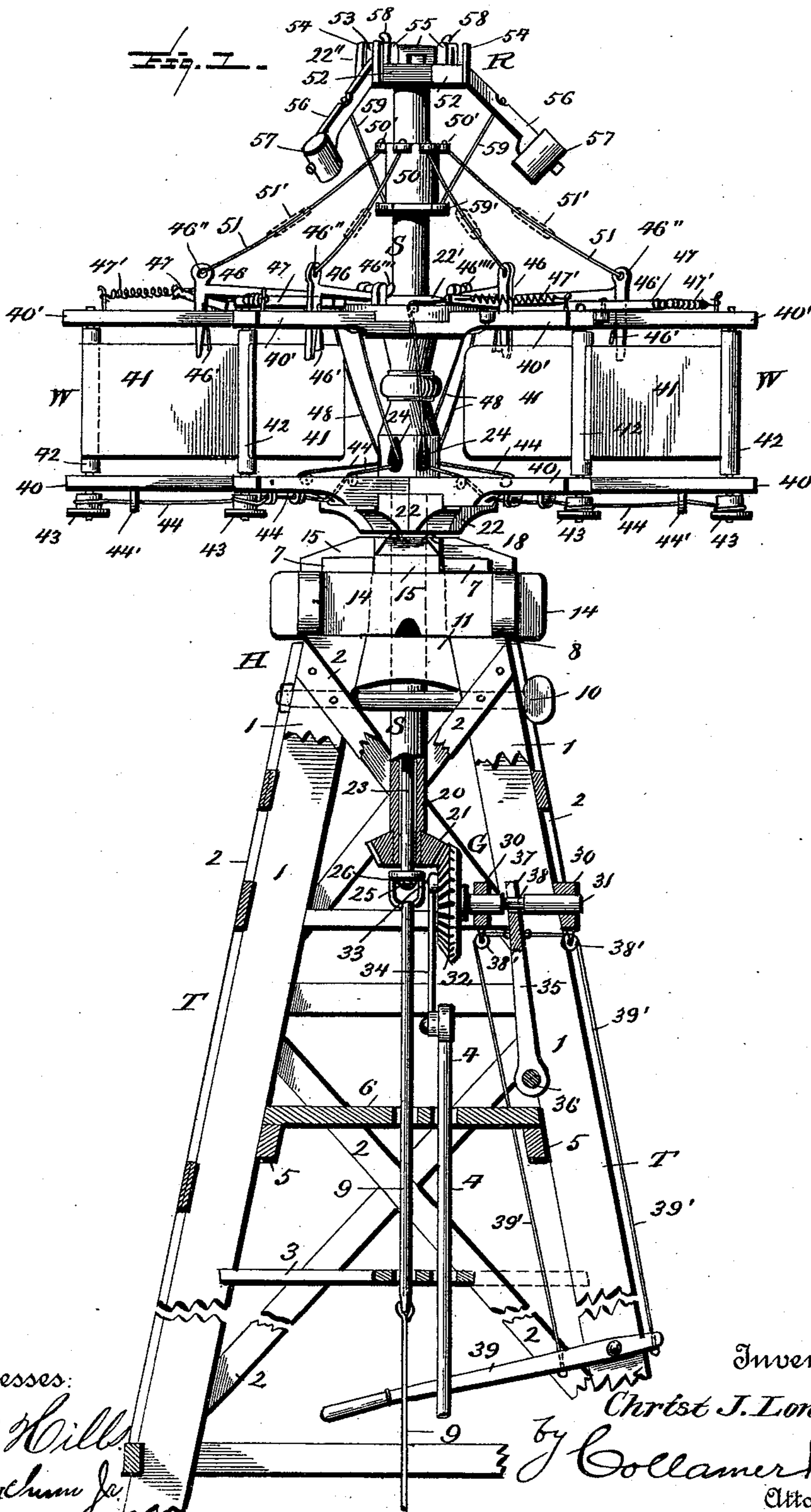


C. J. LONNING.
WINDMILL.

No. 498,068.

Patented May 23, 1893.



Witnesses:
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John Jackson Jr.

Inventor:
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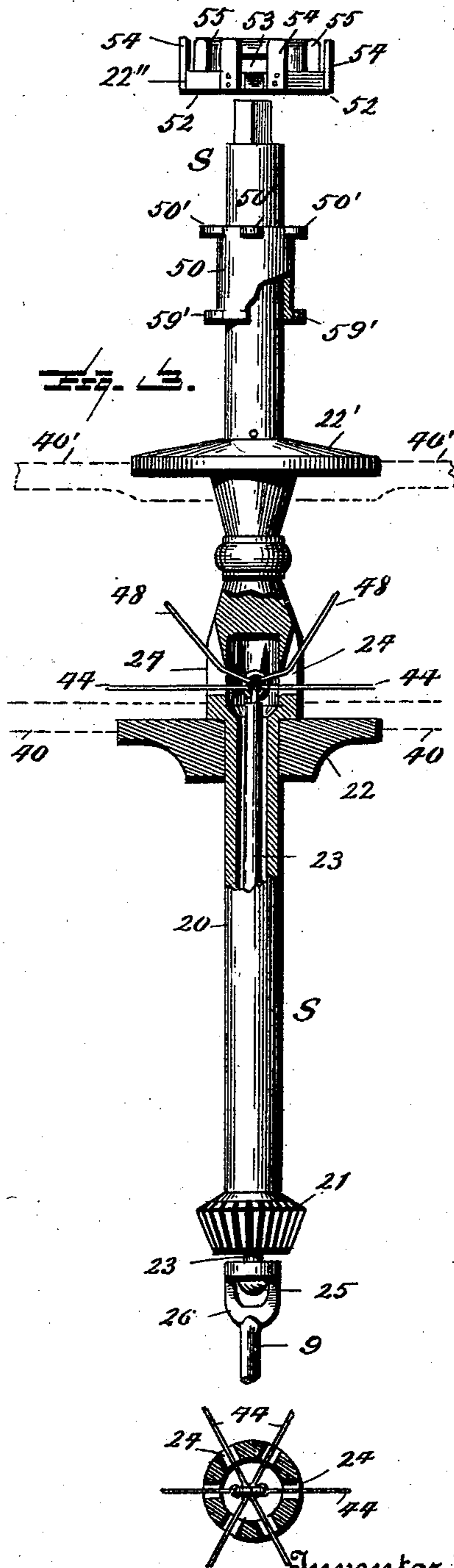
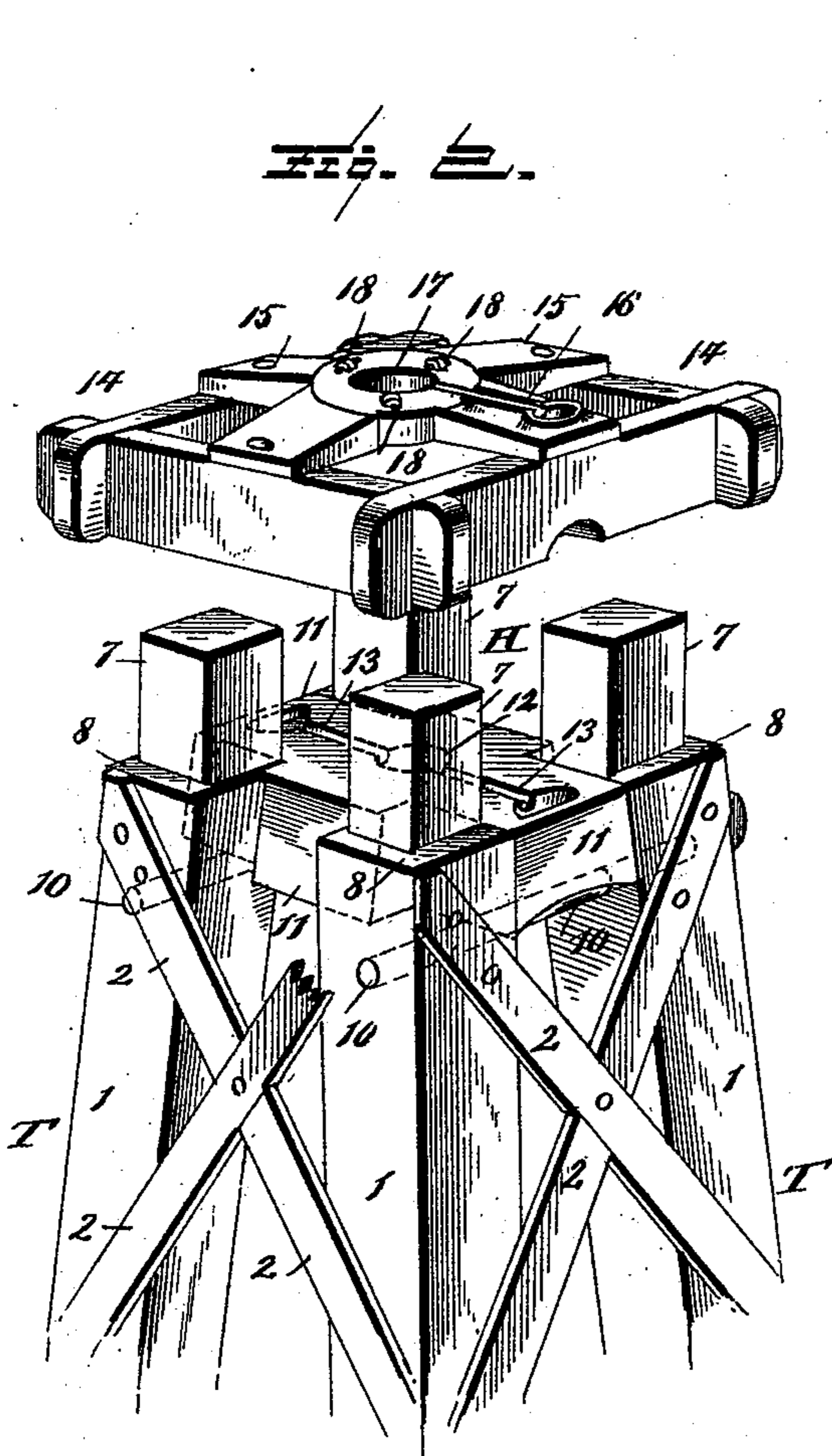
(No Model.)

3 Sheets—Sheet 2.

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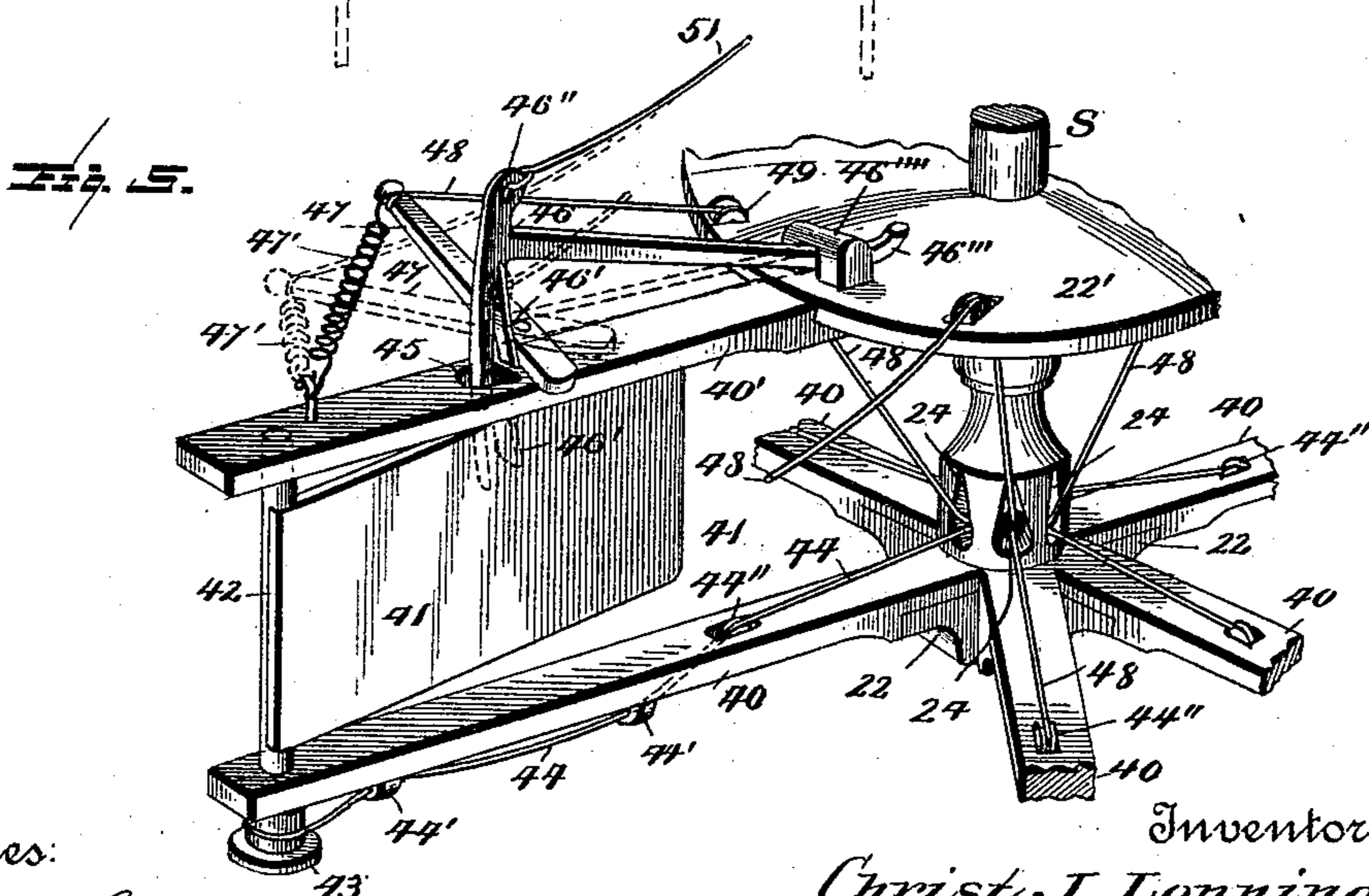
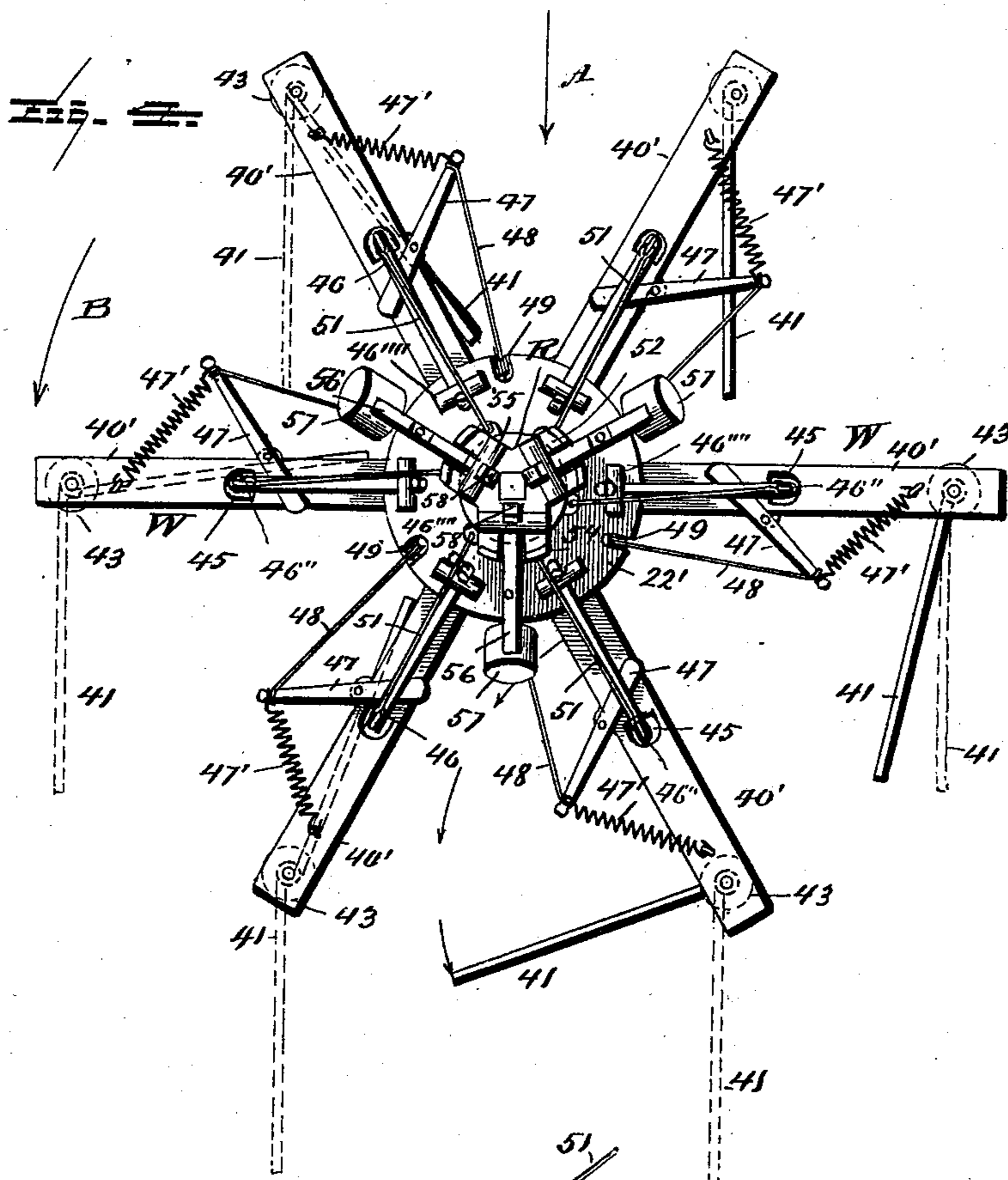
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UNITED STATES PATENT OFFICE.

CHRIST J. LONNING, OF NEVADA, IOWA.

WINDMILL.

SPECIFICATION forming part of Letters Patent No. 498,068, dated May 23, 1893.

Application filed November 10, 1892, Serial No. 451,544. (No model.)

To all whom it may concern:

Be it known that I, CHRIST J. LONNING, a citizen of the United States, and a resident of Nevada, Story county, State of Iowa, have invented certain new and useful Improvements in Windmills; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with claims particularly specifying the novelty.

This invention relates to wind-wheels, and more especially of that class in which the wheel stands in a horizontal plane; and the object of the same is to produce certain improvements in the wheel and in the mechanism for throwing its blades into and out of operative position, as well as to improve the details of construction.

To this end the invention consists in a device constructed substantially as hereinafter more fully described and claimed, and as illustrated on the accompanying drawings, wherein—

Figure 1 is a front elevation of the wheel, and a vertical section of the tower. Fig. 2 is a perspective detail of the parts of the tower-head. Fig. 3 is an elevation (partly in section) of the main shaft with the trippers and the arms of the wheel removed. Fig. 4 is a plan view of the governor and wheel. Fig. 5 is a perspective detail, showing one pair of arms, the blade therein, the tripper as raised in full lines, and the tripper-lever in full lines as about to cause the descent of the tripper, the latter being also shown in dotted lines as down to engage the blade.

In the said drawings, the letter T designates the tower having a peculiar head H wherein is journaled the main upright shaft S. The latter carries the wind-wheel W and regulator R, and is connected by gearing G with the pump-rod or other mechanism to be driven by the wheel. These parts will now be described separately.

The tower T.—The numerals 1 designate preferably four upright posts or legs converging toward their upper ends, and suitably braced by diagonal strips 2. The parts may be of any desired material and connected by bolting or otherwise. Diagonally across within the framework thus formed is located a

horizontal bar 3 through which reciprocates the pump-rod 4 or rod which is to drive the machinery. Across between the legs, and above this bar 3, are two other bars 5 connected by a cross bar 6 through which also the pump-rod moves; and the regulator wire 9 may also pass through both the bars 3 and 6 as shown.

The tower-head H.—Rods or long bolts (two in number) are passed through the legs 1 below their upper ends, and upon these bolts is supported a cross-shaped block 11, its arms being beveled so as to fit closely between the inner faces of the legs and its center provided with a vertical hole 12 for the main shaft S, with lubricating grooves 13 extending therefrom outwardly as shown in Fig. 2. From the upper ends of the legs rise vertical extensions 7, preferably integral with the legs though not following their inward inclination, and which extensions are reduced so as to form shoulders 8. 14 is a frame composed of four pieces mortised into each other at the corners, its size being just sufficient to closely embrace the four extensions but its height or thickness slightly less than the length of said extensions. 15 is another cross-shaped block secured upon the frame and receiving the upper extremities of the extensions, this block also having lubricant-grooves 16, a central hole 17, and preferably anti-friction wheels 18 set in recesses in its upper face.

The main shaft S.—A tubular shaft passes through and is journaled in the two cross-shaped blocks, extending below for some distance and carrying a bevel gear 21 within the tower, and also extending above for some distance as shown. To this shaft is rigidly secured a spider 22 having a flat lower face which rests upon the anti-friction wheels 18 to support the entire shaft and mechanism carried thereby. Within the shaft is located a rod 23 capable of vertical movement and connected at its upper end with wires or chains which lead through lateral holes 24 in the shaft to the trippers as described below. The lower end of this rod has an enlarged head 25 which enters a swivel-yoke 26, and to this yoke is connected the rod or wire 9 known as the "regulator wire" which passes down through holes in the bars 3 and 6 to within

reach of the operator on the ground, and by which the rod 23 may be drawn down within the shaft even while the latter is in motion.

The gearing G.—30 30 are suitable boxes supported by the tower and within which is located a shaft 31 capable of turning and sliding longitudinally in the boxes, and 32 is a bevel gear keyed on this shaft and adapted to engage the gear 21 on the main shaft. 33 is a crank-pin in the bevel gear 32, which pin is connected by a pitman rod 34 with the pump-rod 4. 35 is a lever pivoted at 36 to the tower and having a forked end 37 loosely engaging a groove 38 in the shaft 31, and 39 is a hand-lever located near the ground, pivoted to the tower, and connected with the forked lever 35 in any suitable manner, as by cords or chains 39' passing over pulleys 38' as shown—the arrangement being such that by operating the hand-lever the forked lever may be moved to throw the bevel gear 32 into or out of mesh with the bevel gear 21 on the main shaft and thus to stop or start the reciprocation of the pump-rod as desired but without stopping the motion of the wind-wheel. Obviously the pitman rod is loosely pivoted in order to permit the movement of the shaft 31 as described.

The wind wheel W.—40 are radial arms secured to and projecting from the spider 22, and 40' are other radial arms also projecting from another spider 22' on the main shaft and above that lettered 22—there being about six pairs of these arms with the upper of each pair standing above the lower. Each pair of arms carries a blade 41 secured to a shaft 42 which is journaled in the outer ends of its arms and has a wheel 43 on its lower end. Around this wheel passes a chain or cord 44, which leads through eyes 44' along the lower arm, then up through a hole 44'' in said arm, and then through one of the lateral holes 24 in the tubular main shaft to the rod 23 to which it is connected in any suitable manner. All the cords 44 are wound in the same direction around their respective wheels 43, and that direction is such that, when the regulator wire is drawn upon, the blades will all be caused to swing inward to and pass through between their respective arms 40 and 40', whereas at other times the force of the wind will move the blades in the opposite direction. Through each upper arm 40' is a hole 45 at a proper point to receive the tip of an L-shaped tripper 46; and to the inner face of the foot of such tripper is secured a spring finger 46' which normally stands at such distance from said tip as to prevent the latter passing through said hole when the tripper has been raised sufficiently by the regulator to be described below. 47 is a tripper-lever pivoted between its ends to the upper arm 40', its inner end standing in position to bear the finger toward the foot, and its outer end being connected by a contractile spring 47' with the upper arm farther out, which spring holds this lever normally out of operative position. The outer end of the lever is con-

nected by a cord or chain 48 (leading over a pulley 49 in the upper spider 22' and thence through one of the lateral holes 24) with the regulator wire—all as fully shown in the drawings. 70

The regulator R.—50 is a collar sliding loosely on the main shaft above the upper spider, and 50' are eyes in this collar connected by wires or chains 51 with eyes 46'' at the angles of the trippers. These wires may have turn-buckles 51' for adjusting them in length, or other means may be provided for this purpose. As the collar rises and the trippers are drawn up, their inner ends 46''' slide inwardly through staples 46'''' on the upper spider 22', and when the tripper-levers are operated, this motion is reversed. 22'' is the uppermost spider carried at the extreme upper end of the main shaft and having radial arms 52 each provided with a radial slot 53, upright ears 54 at the sides of the slot, and a staple 55 upon the spider opposite the inner end of the slot. 56 are the regulator arms whose outer ends are weighted as at 57 and whose inner ends are hooked upward as at 58 so as to pass between the ears, into the slots, and under the staples; and the bodies of these arms are connected by chains or wires 59 with eyes 59' on the collar 50—other means being also here employed, if desired, for adjusting the length of the wires. 75 80 85 90 95

The operation: Figure 4 shows the blades in full lines in operative position with the wind blowing in the direction of the arrow —A— and the wheel turning in the direction of the arrow —B—. At this time the regulator entire will rotate with the main shaft, and the lower spider 22 will turn upon the anti-friction wheels as will be clear. If the gears be thrown into engagement by the hand-lever, the pump-rod will be reciprocated vertically and any machinery (as a pump) connected therewith will be driven. To stop the motion of this machinery, the hand-lever is moved and the shaft 31 slides with the gear 32 until the latter is disengaged from the gear 21, when the machinery will come to rest, but the wheel will continue to revolve. Reconnection may be made by moving the hand-lever in the opposite direction. Meanwhile the swivel-yoke 26 permits the rod 23 to turn without twisting the regulator wire. As the wind increases in force, the weighted ends of the regulator arms are thrown outward by centrifugal force, and the wires 59 draw the collar upward. This motion draws upon the chains 51 and the feet of the trippers are raised. When they have risen far enough to disengage from behind the upper edges of the blades, the spring-fingers 46' pass through the holes 45 and spring inwardly upon the upper arms 40' (the tension on the chains 51 assisting) and the trippers also slip at their inner ends through the staples 46'''' so that the trippers are supported in elevated position and the blades are allowed to swing clear into the wind as seen in dotted lines in 100 105 110 115 120 125 130

Fig. 4. The wind-wheel then comes to rest and the governor falls. If the wires 51 have the turn-buckles 51' as shown in dotted lines, the length of such wires may be so adjusted
 5 that as the governor arms rise, first one or one pair of blades will be freed, then another, and finally all. Hence, as less and less blades are exposed to the wind, the wheel will move more and more slowly, and a hurricane would free
 10 even the last pair. After the wind wheel has come to rest, and it becomes desirable to have it resume its rotation, the operator draws on the regulator wire. This moves the rod 23 downward, draws on the several cords or
 15 chains 44, and—by reason of their reverse winding on the wheels 43 of the blade-shafts—causes the blades to be drawn inward to and through between the arms 22 and 22'. Meanwhile the cords or chains 48 are also drawing
 20 on the tripper-levers 47; and, just as the blades have passed into position, these levers bear against the fingers 46' and press them toward the tripper-feet so that they pass down by gravity into and through the holes 45 and their
 25 tips engage the upper edges of the blades to hold them in operative position. The wheel then resumes its rotation, and the operation continues as above described.

What is claimed as new is—

30 1. In a windmill, the combination with a support, and a vertical shaft journaled therein; of arms on said shaft arranged radial thereto and in pairs, wings secured to shafts which are journaled in said arms, wheels on
 35 said shafts, cords wound in corresponding directions on said wheels and connected with a common cord leading to the ground, trippers in said arms for preventing the turning of the wings in one direction, and means substantially as described for raising said trippers, as
 40 and for the purpose set forth.

2. In a windmill, the combination with a support, and an upright shaft journaled therein and carrying a frame; of shafts journaled
 45 in said frame and carrying wings, wheels on said shafts, cords wound in corresponding directions on said wheels and connected with a common cord leading to the ground, trippers on said frame adapted to prevent the turning
 50 of the wings, a governor for automatically raising said trippers out of engagement with the wings when the speed of rotation of the wheel increases, and means substantially as described for lowering them again from the
 55 ground, as and for the purpose set forth.

3. In a windmill, the combination with a support, an upright shaft journaled therein and carrying a frame, shafts journaled in the
 60 outer ends of said frame and having blades, wheels on said shafts, and cords wound in

corresponding directions on said wheels and connected to a common cord leading to the ground; of trippers on said frame adapted when lowered to prevent the turning of said wings, spring fingers on the trippers holding
 65 them raised, levers engaging said fingers, cords connecting said levers with said common cord, and means substantially as described for raising said trippers, as and for the purpose set forth.
 70

4. In a windmill, the combination with an upright rotatable shaft carrying a frame, shafts journaled in said frame and having blades, a cord leading to the ground, and connections between this cord and the shafts for
 75 turning the latter in one direction; of trippers on said frame adapted when lowered to prevent the turning of said blades, spring fingers for holding the trippers raised, levers for moving said fingers, cords connecting said le-
 80 vers with the ground-cord, a centrifugal governor on said main shaft, and cords connecting the governor with the trippers for raising the latter, as and for the purpose set forth.

5. In a windmill, the combination with a
 85 pair of arms one of which has a hole, a shaft journaled in said arms and carrying a blade, and means for turning said shaft in one direction; of an L-shaped tripper whose foot passes through said hole and is adapted to
 90 engage the blade, a spring finger secured under the foot and adapted to hold its tip out of engagement with the blade, means for drawing said foot from the hole, a lever pivoted between its ends to the arm, its inner end
 95 standing adjacent said finger and its outer end being connected by a contractile spring with the arm, and a cord leading from said outer end to the ground, as and for the purpose set forth.
 100

6. In a windmill, the combination with an arm having a hole, a blade swinging in the plane of and beneath said arm, an L-shaped tripper whose foot passes through the hole and engages the blade, and means for sup-
 105 porting the foot or lowering it at will; of a staple at the inner end of the arm through which the shank of the tripper slides loosely, a collar moving from said arm at one end thereof, and a cord connecting the collar with
 110 the angle of the tripper, as and for the purpose set forth.

In testimony whereof I have hereunto subscribed my signature on this the 7th day of November, A. D. 1892.

CHRIST J. LONNING.

Witnesses:

OVE. O. ANDERSEN,
 D. J. VINJE.