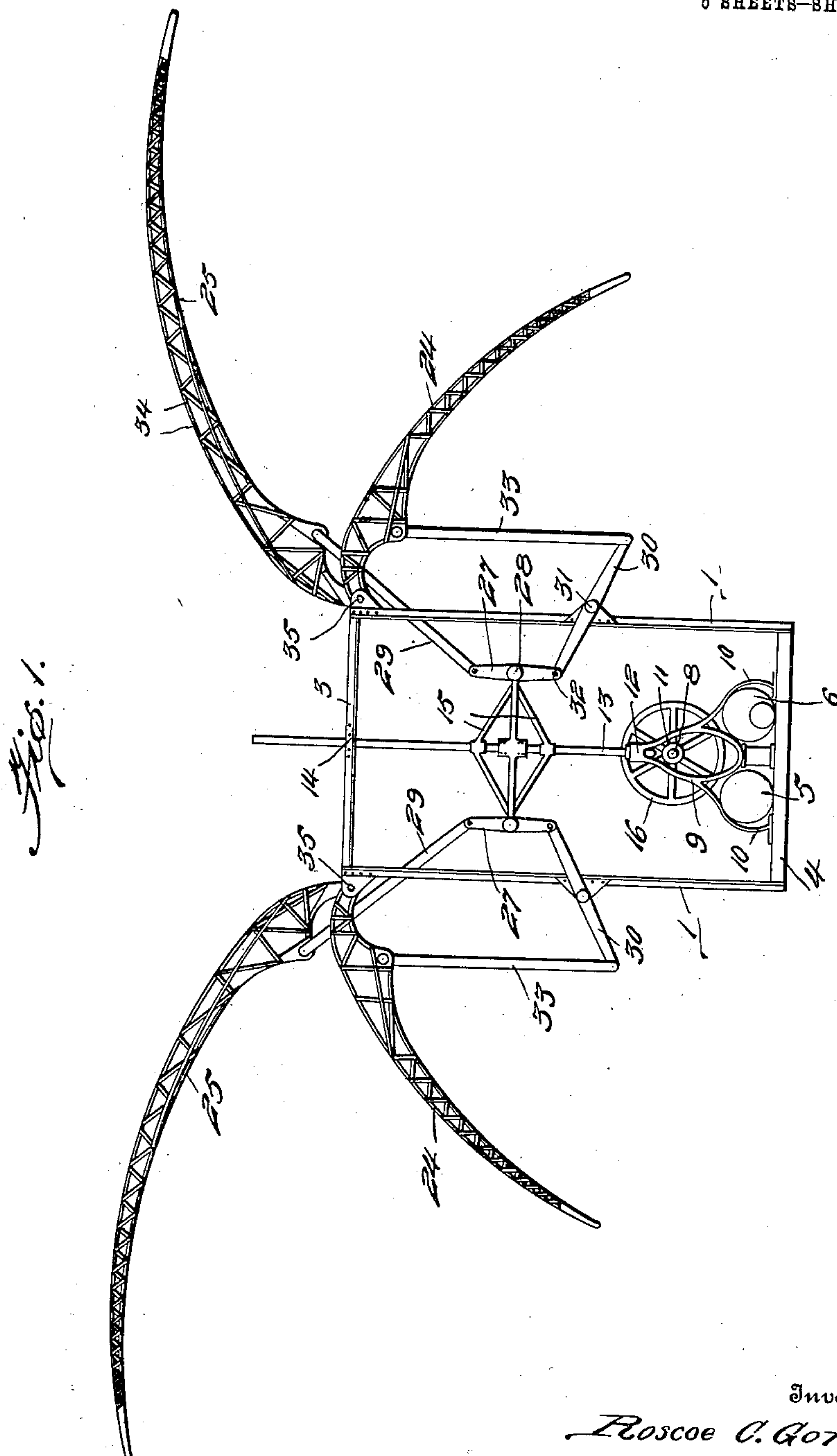


979,286.

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AERIAL NAVIGATOR.  
APPLICATION FILED DEC. 29, 1908.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 1.



Witnesses

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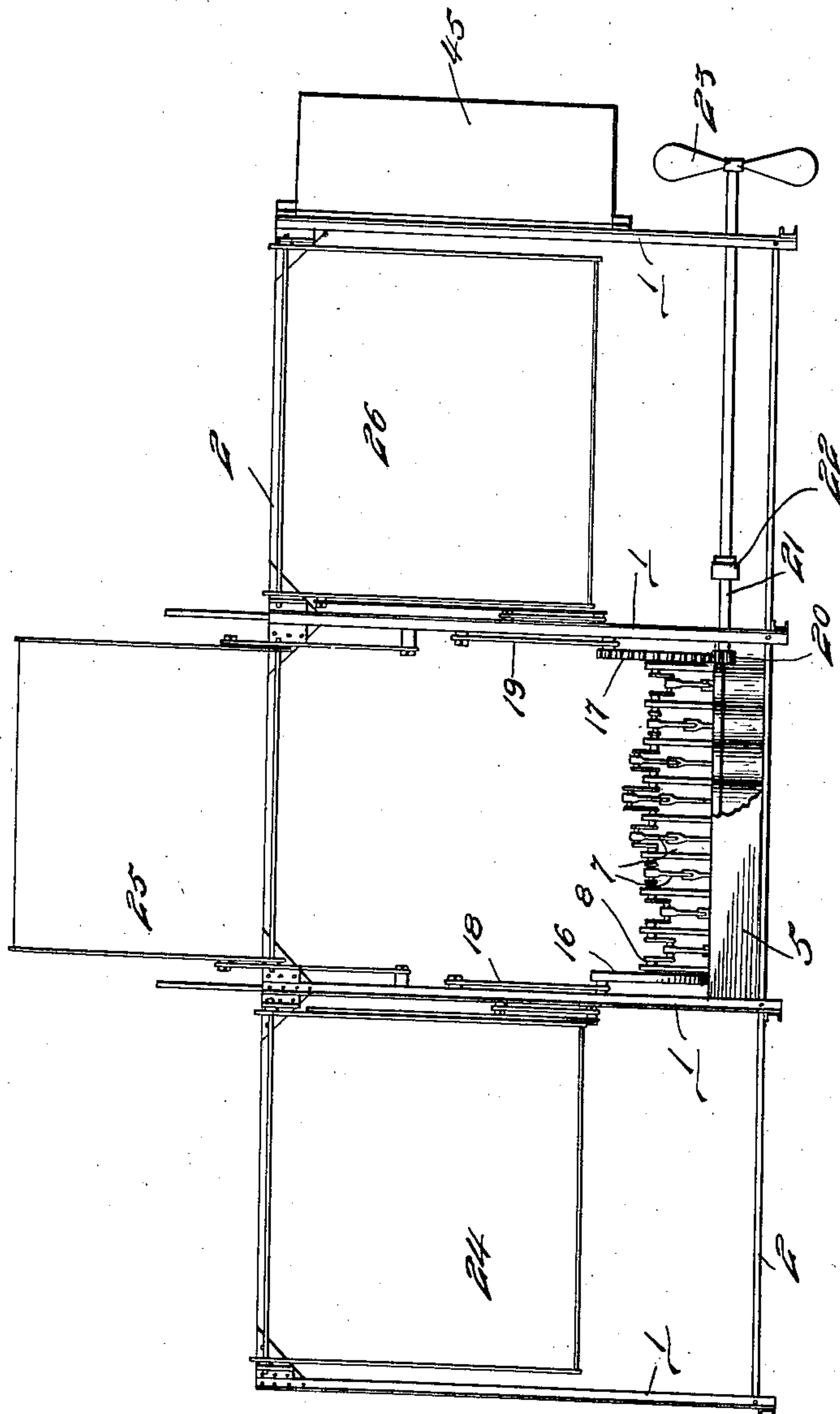
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5 SHEETS—SHEET 2.



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5 SHEETS—SHEET 3.

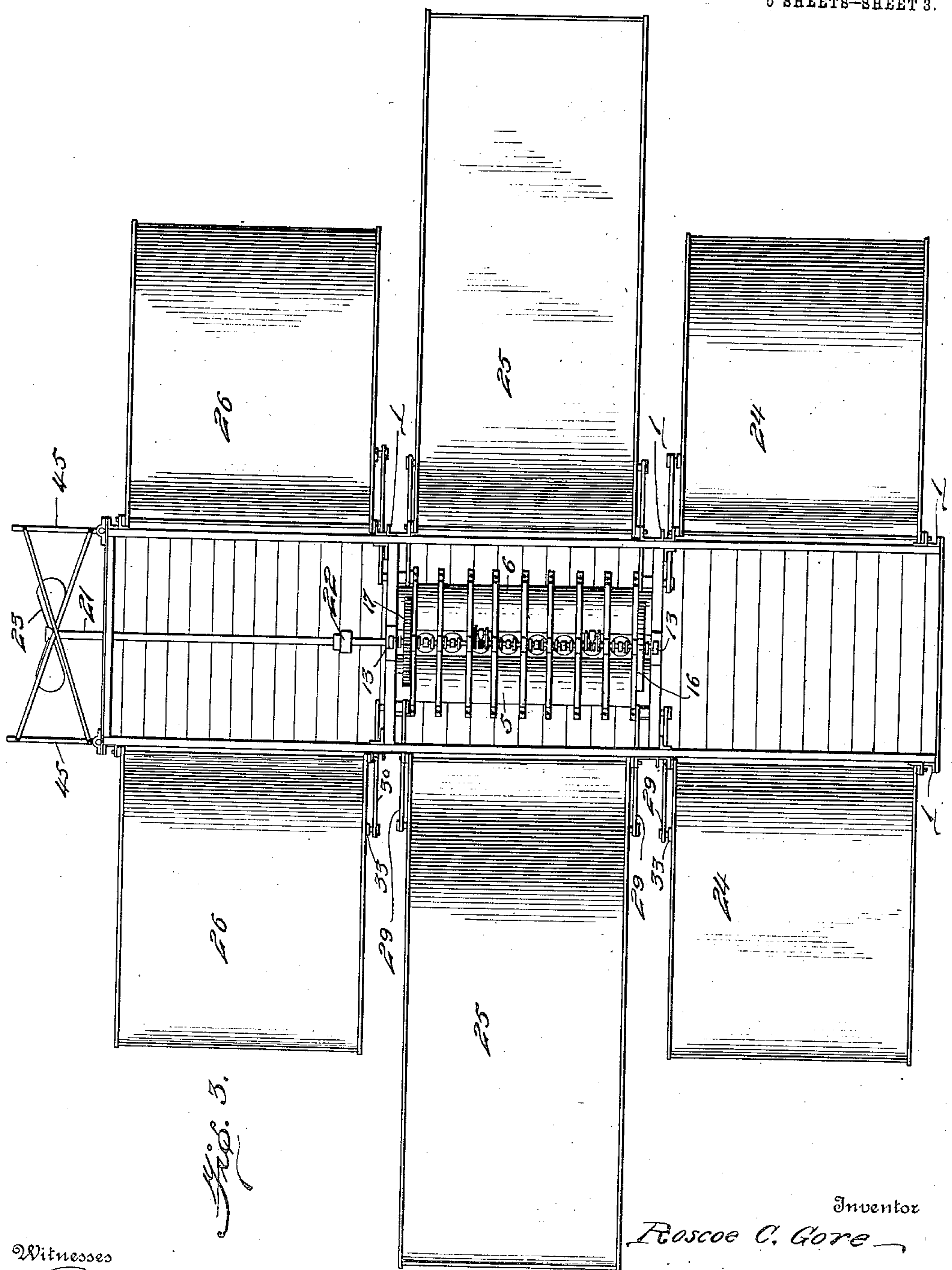


Fig. 3.

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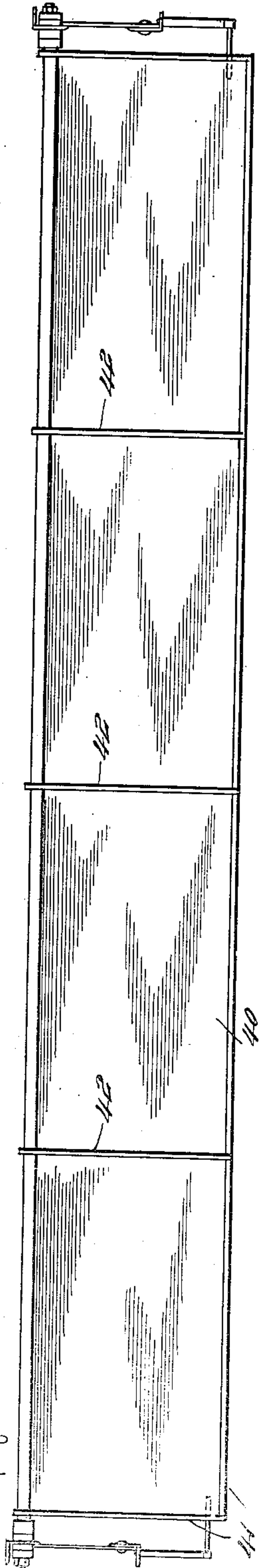
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Fig. 5.



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Fig. 6.

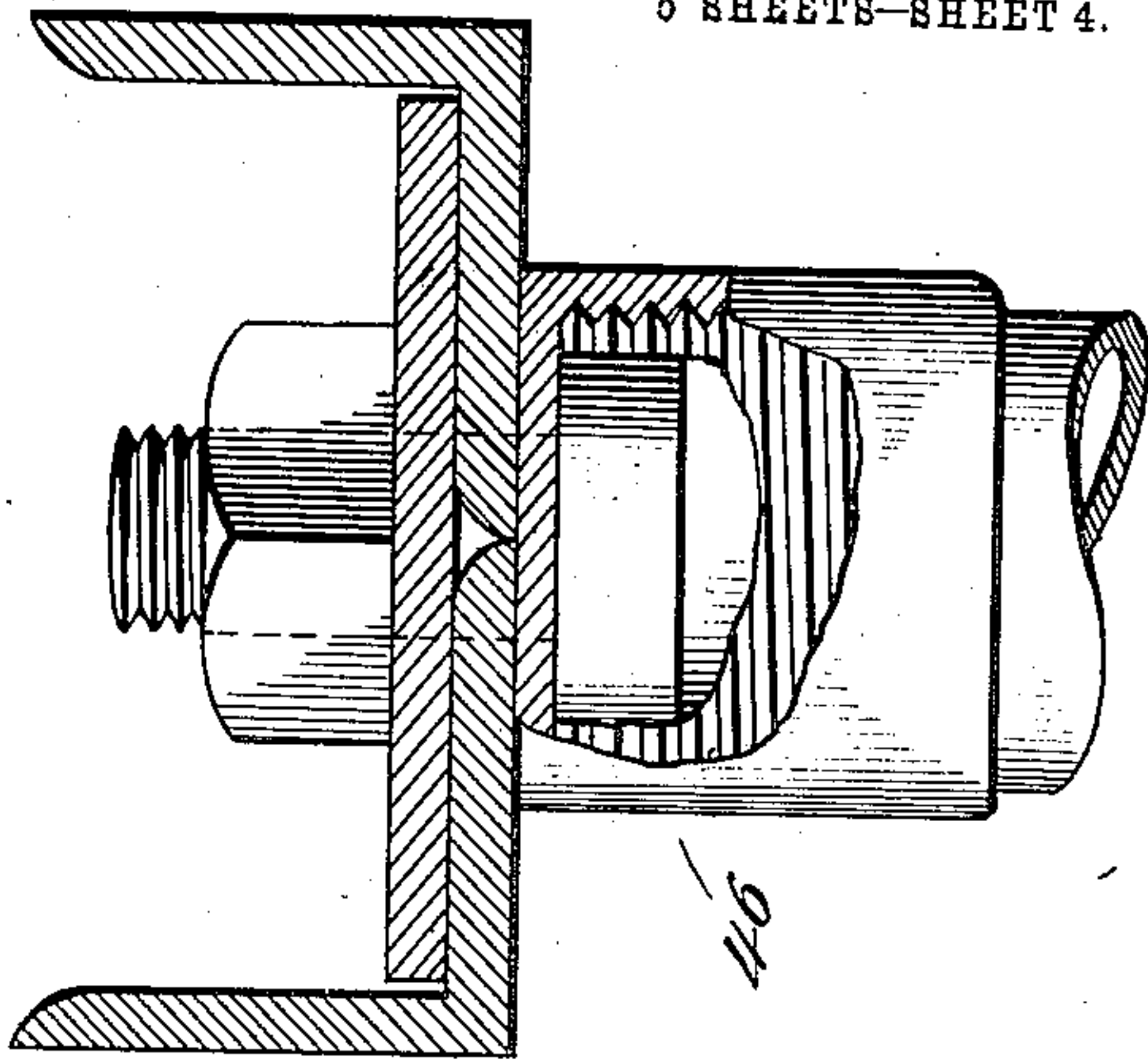


Fig. 7.

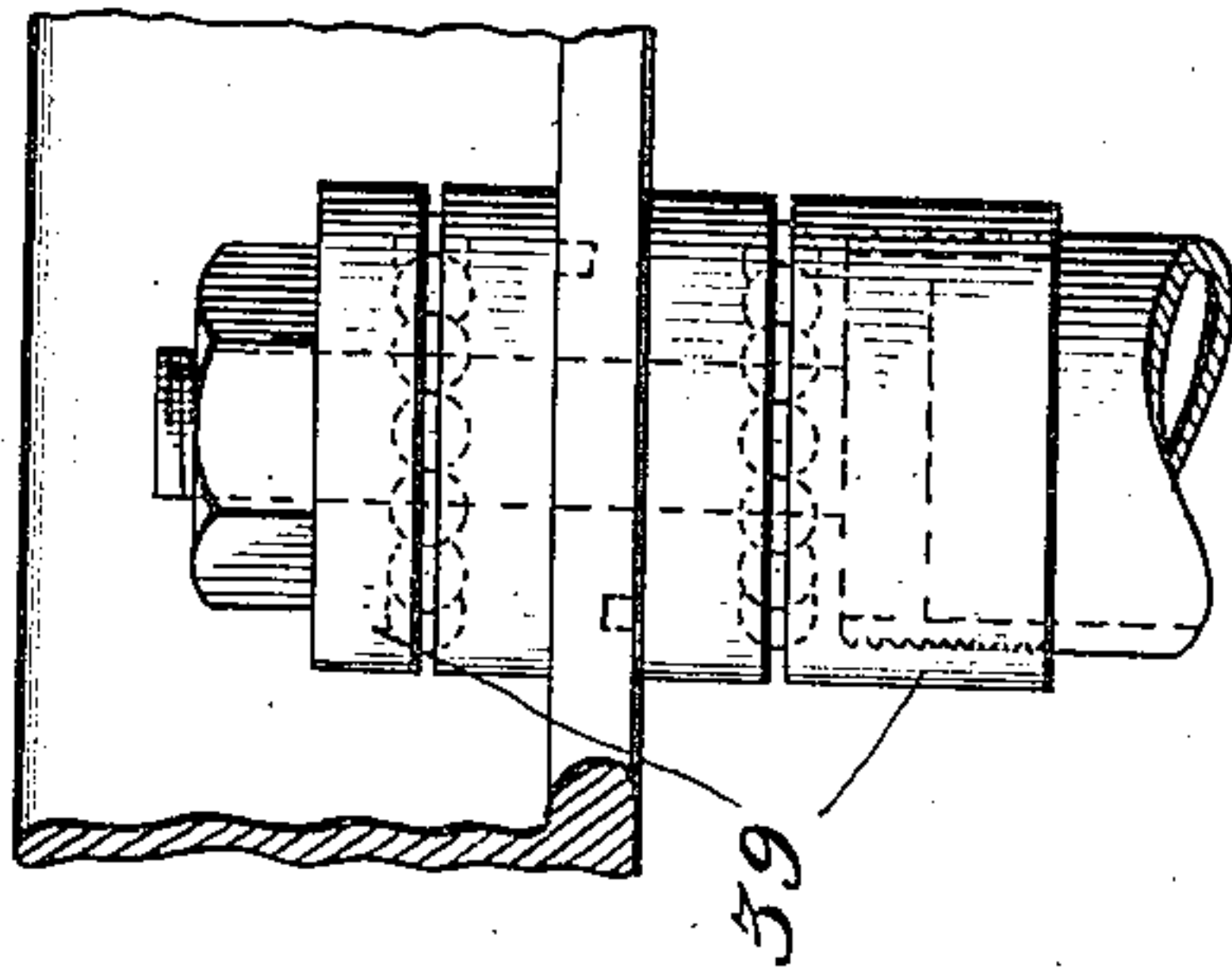


Fig. 8.

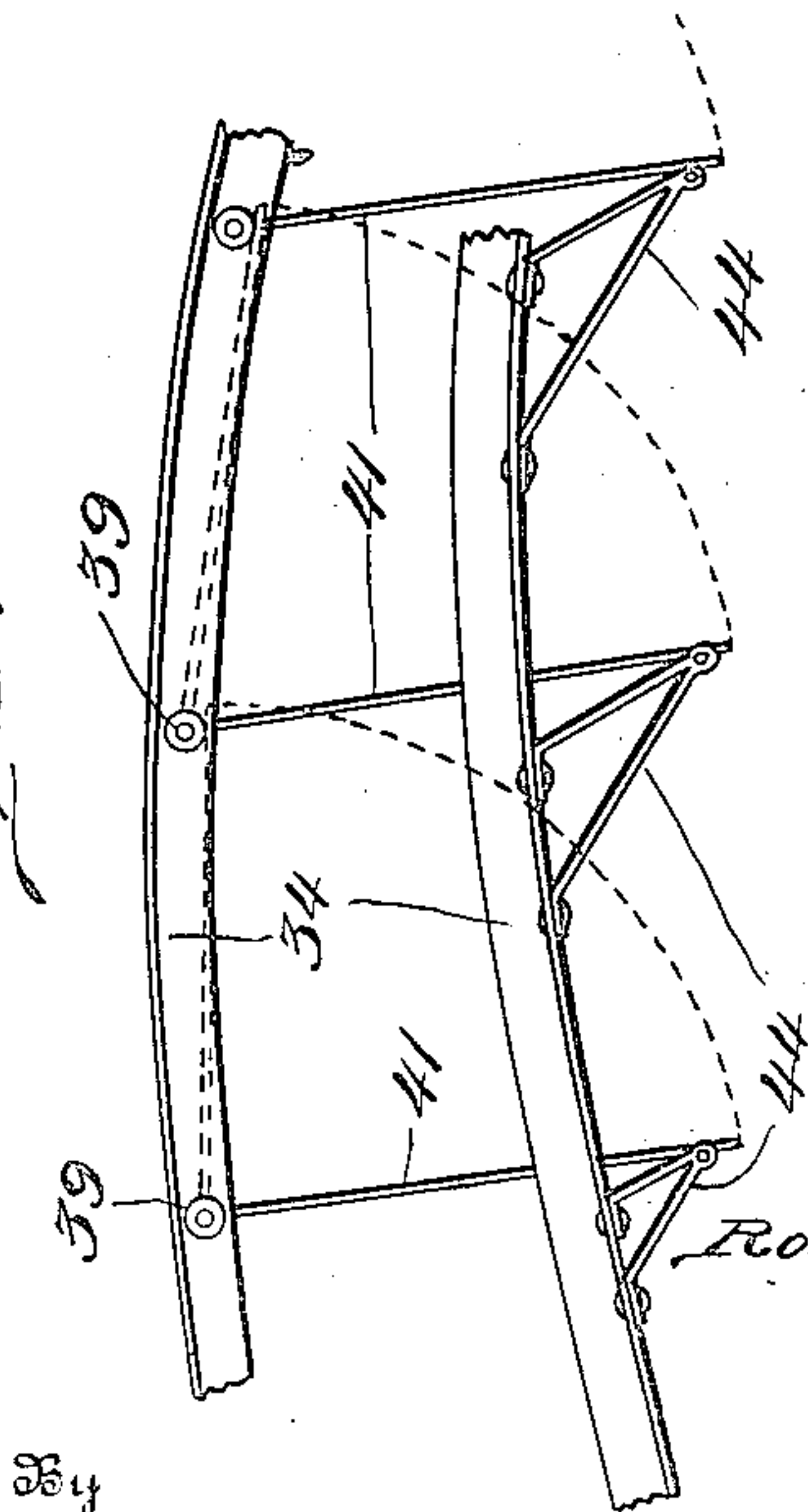


Fig. 8.

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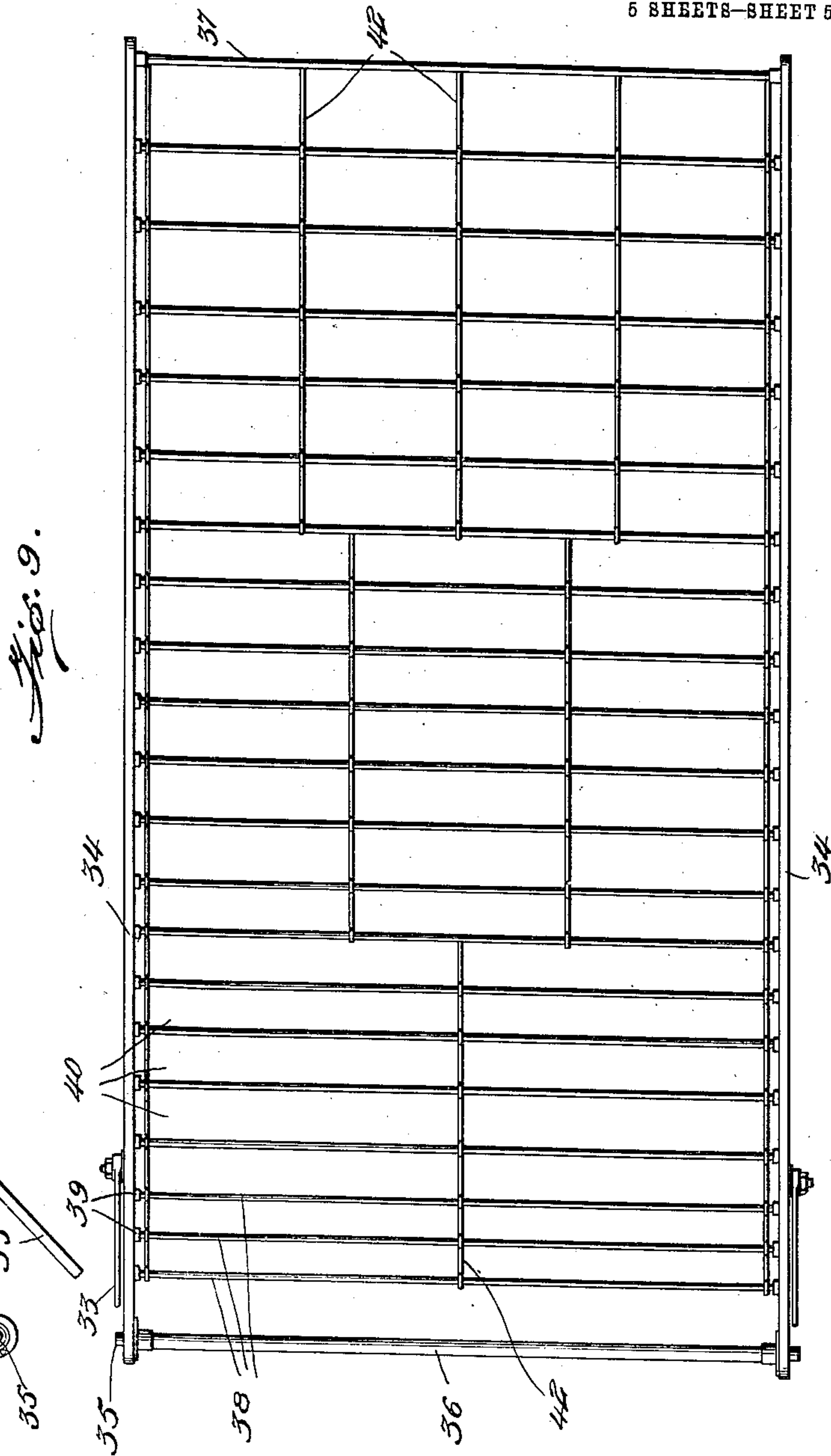
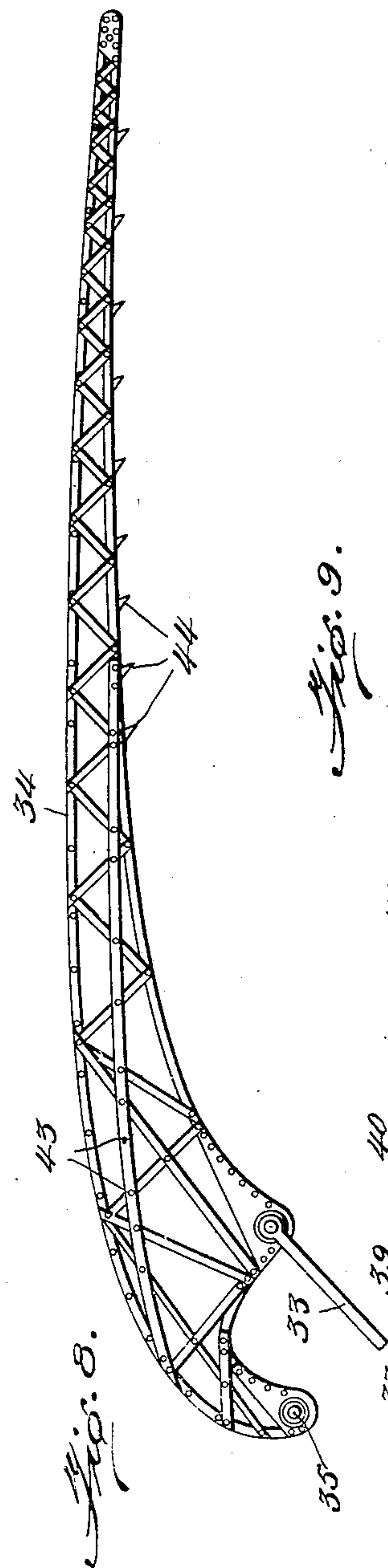


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5 SHEETS—SHEET 5.



Witnesses

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# UNITED STATES PATENT OFFICE.

ROSCOE C. GORE, OF TECUMSEH, NEBRASKA.

## AERIAL NAVIGATOR.

979,286.

Specification of Letters Patent.

Patented Dec. 20, 1910.

Application filed December 29, 1908. Serial No. 469,870.

*To all whom it may concern:*

Be it known that I, ROSCOE C. GORE, a citizen of the United States, residing at Tecumseh, in the county of Johnson and State of Nebraska, have invented certain new and useful Improvements in Aerial Navigators, of which the following is a specification.

My invention relates to improvements in aerial navigators, and it consists in the constructions, combinations and arrangements herein described and claimed.

An object of my invention is to provide an improved aerial navigator constructed to operate on the principle of a bird's flight, and to automatically act as a parachute upon accident or failure of its operating parts.

A further object of my invention is to provide an aerial navigator in which beating planes are operated in groups disposed symmetrically to the center of gravity of the navigator, for maintaining a continuous lifting force; thereby avoiding the difficulties incident to the use of a long starting track in previous constructions.

A further object of my invention is to provide an aerial navigator constructed to ride on an even keel, and to maintain its equilibrium under all conditions of air currents.

In the accompanying drawings, forming a part of this application and in which similar reference numerals indicate corresponding parts in the several views: Figure 1 is a front elevation, illustrating one embodiment of my invention; Fig. 2 is a side elevation of the construction; Fig. 3 is a plan view of the construction; Fig. 4 is a fragmentary side view of one of the beating planes with the shutters in open position; Fig. 5 is a front view of one of the shutters; Fig. 6 is a detail view, partly in section, showing a preferred connection between the side and end frame members of one of the beating planes; Fig. 7 is a detail plan view, showing a preferred means for rotatably securing the tie rods in position; Fig. 8 is a side elevation of one of the beating planes with the swinging shutters in closed position, and Fig. 9 is a plan view of the beating plane shown in Fig. 8.

Referring to the drawings, 1 indicates the side uprights of a frame, connected by two upper and two lower longitudinal side mem-

bers 2 held in parallel spaced relation and by transverse top members 3 and base members 4; said several frame members being preferably formed of angle iron to provide a maximum rigidity with a minimum of weight. The base members carry a suitable flooring, or support, for a motor and reservoirs for supplying a motive fluid thereto. Thus, where steam is employed as the motive power, a fuel-oil tank 5 and an internal combustion boiler 6 can be advantageously used; while, with an explosive engine, such tank 5 and boiler 6 can be replaced by a carbureter and suitable oil reservoir.

I have shown the motor comprising a multi-cylinder engine; the several cylinders of which are arranged along the central line of the supporting base, with their pistons connected by rods 7 to a common crank shaft 8. This provides a very advantageous construction, in which the equilibrium and balance of forces will be maintained should a portion of the motor cylinders become inoperative through accident.

End brackets 9 are secured to the engine cylinders, and provided with legs 10 attached to the frame base for clamping the reservoirs in position; said brackets being provided with bearings 11 for the crank shaft 8, and bearings 12 for the lower ends of the vertically disposed slide bars 13. The upper ends of the slide bars 13 are slidably mounted in guides 14 on the top frame members 3, and said bars are provided with cross-heads 15. Disk cranks 16 and 17 are connected by connecting rods 18 and 19 to the adjacent slide bars for reciprocating the latter in their bearings 12 and 14; the rear disk crank being provided with spur teeth meshing with a pinion 20 secured to a horizontal propeller shaft 21. The shaft 21 is provided with a suitable disengaging device, such as a friction clutch 22, and carries one or more propellers 23.

A suitable series of pivotally secured beating planes 24, 25 and 26 are pivotally secured along each side of the navigator frame, and provided with means for operating them in groups of substantially equal lifting power disposed symmetrically to the center of gravity of the navigator. I have shown such series comprising a medial plane 25, and front and rear planes 24 and 26 having a combined lifting power substantially equal to that of said medial plane. Main



rock links 27 are pivotally secured at 28 to the ends of the cross heads 15 and connected by bars 29 to the side edges of the medial planes 25. Rock levers 30 are fulcrumed at 31 on the side uprights 1 of the frame, and have their inner ends pivotally secured to the main levers 27 at 32. The free ends of said levers 30 are connected by hangers 33 to the adjacent side edges of the front and rear beating planes 24 and 26.

From the above description, it will be seen that the front and rear beating planes are operatively connected at only one edge, while the medial planes of greater lifting power are operatively connected by the links 29 at both edges; thereby distributing the operating force to the several planes in proportion to their lifting power, or the work developed thereby. Each beating wing is shown provided with a rectangular frame comprising truss side members 34 pivoted at 35 and constructed to provide a uniform strength and rigidity throughout their length, and end members 36 and 37 which preferably constitute tubes secured to said side members.

A series of tie rods 38 extend between the side members 34, to which they are rotatably secured by ball-bearing connections 39, as shown especially in Fig. 5; the space between the several tie rods of the series increasing toward the outer, or free, edge of the beating plane. A swing shutter 40 is secured to each of the rotatable tie rods, and constructed of sufficient width to underlap the next succeeding tie rod of the series when swung to closed position; thereby providing a series of independent swing shutters which increase in width toward the outer end of the beating plane. Each shutter can be advantageously formed of suitable fabric, braced by a light rigid frame of nickel-aluminum alloy 41 strengthened by cross braces 42; the number of such cross braces being shown increasing toward the outer end of the plane. The side frame members 34 of the beating frames carry stop pins 43 and buffers 44 in position to engage the frames 41 of the shutters for limiting the swing to open position of the latter.

The main frame and the side members of the beating planes can be formed of angle iron, but preferably of angle bars of suitable aluminum alloy to provide a maximum rigidity and strength with a minimum weight. If desired, the swing shutters could be formed of thin sheets of such alloy. As the lifting power of a beating plane depends on its surface area and velocity of movement, the medial plane of my construction requires an area less than seven-tenths of the combined areas of the front and rear planes; thereby enabling an equalization of the lifting powers of the several groups of

planes without necessitating excessively large plane areas.

In the operation of my invention, the clutch 22 is disengaged and the motor started to oppositely operate the groups of beating planes. During upward swing of the planes, the shutters 40 will swing freely to their open position, thereby minimizing resistance to the air; while, during downswing of the planes, the shutters will be closed by the air pressure to form a continuous close surface for providing a maximum lifting power. It will be noted that the beating planes are slightly concaved on their lower faces to prevent too free escape and insure an efficient cushioning of the air therebeneath. After the beating planes have reached a sufficient velocity to overcome the weight of the navigator, the latter will rise from the ground and continue to ascend as long as such velocity of the planes is maintained; the height of the navigator during flight being accurately regulated by varying the velocity of the beating planes. Forward movement of the navigator is obtained by engaging the clutch 22 to drive the propeller, or propellers, 23, and vertical rudders 45 may be pivotally secured to the rear frame uprights 1 for laterally guiding the navigator's flight.

I have illustrated a preferred construction in which the several beating planes are pivoted on parallel axes, but it will be obvious that said axes could be inclined upwardly toward the rear for causing the navigator to be driven forward by a component of the lifting force of the beating planes.

I have illustrated a preferred and satisfactory construction, but changes could be made within the spirit and scope of my invention.

By increasing the spacing between the tie rods toward the outer or free edge of the meeting planes, two important objects are attained of value in the construction of aero structures of this nature. One consists in the fact that the efficiency of the action of the shutters is increased, by reason of the fact that owing to the lesser movement of the wing adjacent its pivotal point a large shutter might not be brought into perfect closed position during the stroke of the wing, when a small shutter, because of the lesser distance required for its complete closure would be so operated; while owing to the longer stroke of the outer portion of the wing a larger shutter may very readily be operated thereat. A further object attained is the lightening of the wing toward its outer extremity, by the reduction in the number of cross rods utilized at a point where each lessening of the weight results in a much greater reduction in the amount of power needed for the operation of the device.



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

1. In an aerial navigator, the combination  
5 of beating planes, each plane comprising a  
pivottally supported rectangular frame, a  
series of rotatably secured tie rods extending  
across said frame parallel to the free edge  
of the latter, the spaces between said tie rods  
10 gradually increasing toward the free edge of  
said frame, shutters secured to said rota-  
table tie rods and constructed to underlap  
the next succeeding tie rod of the series  
when swung to closed position, and means  
15 for operating said beating planes, substan-  
tially as described.

2. The combination in a device of the  
character described, of a rectangular frame  
including two upper bars held in parallel  
20 spaced relation, a motor carried by said  
frame, vertically disposed slide bars carried  
by said frame and actuated by said motor,  
a horizontal shaft carried by said frame and  
actuated by said motor, a propeller secured  
25 to the rear end of said shaft, a plurality of  
curved horizontally disposed beating planes  
pivottally secured to said upper bars, com-  
prising two oppositely positioned medial

beating planes and two front and two rear  
planes, said medial planes having a lifting 30  
power equal to that of said front and rear  
planes, a cross head carried by said slide  
bars, a rock link secured to each end of said  
cross head, a connecting bar extending from  
the upper end of each rock link and secured 35  
to said medial planes, rock levers carried by  
said frame and secured to the lower ends of  
said rock links, and hangers extending from  
said front and rear beating planes and se-  
cured to the outer ends of said rock levers. 40

3. An aerial navigator, the combination  
of beating planes, each plane comprising a  
pivottally supported frame, shutters mov-  
ably secured to said supported frame the  
width of said shutters gradually increasing 45  
toward the free edge of said frame and con-  
structed to underlap one another when  
swung to closed position, and means for op-  
erating said beating planes substantially as  
and for the purpose described. 50

In testimony whereof I affix my signature  
in presence of two witnesses.

ROSCOE C. GORE.

Witnesses:

L. D. SPENCE,

F. W. FORNEFELT.