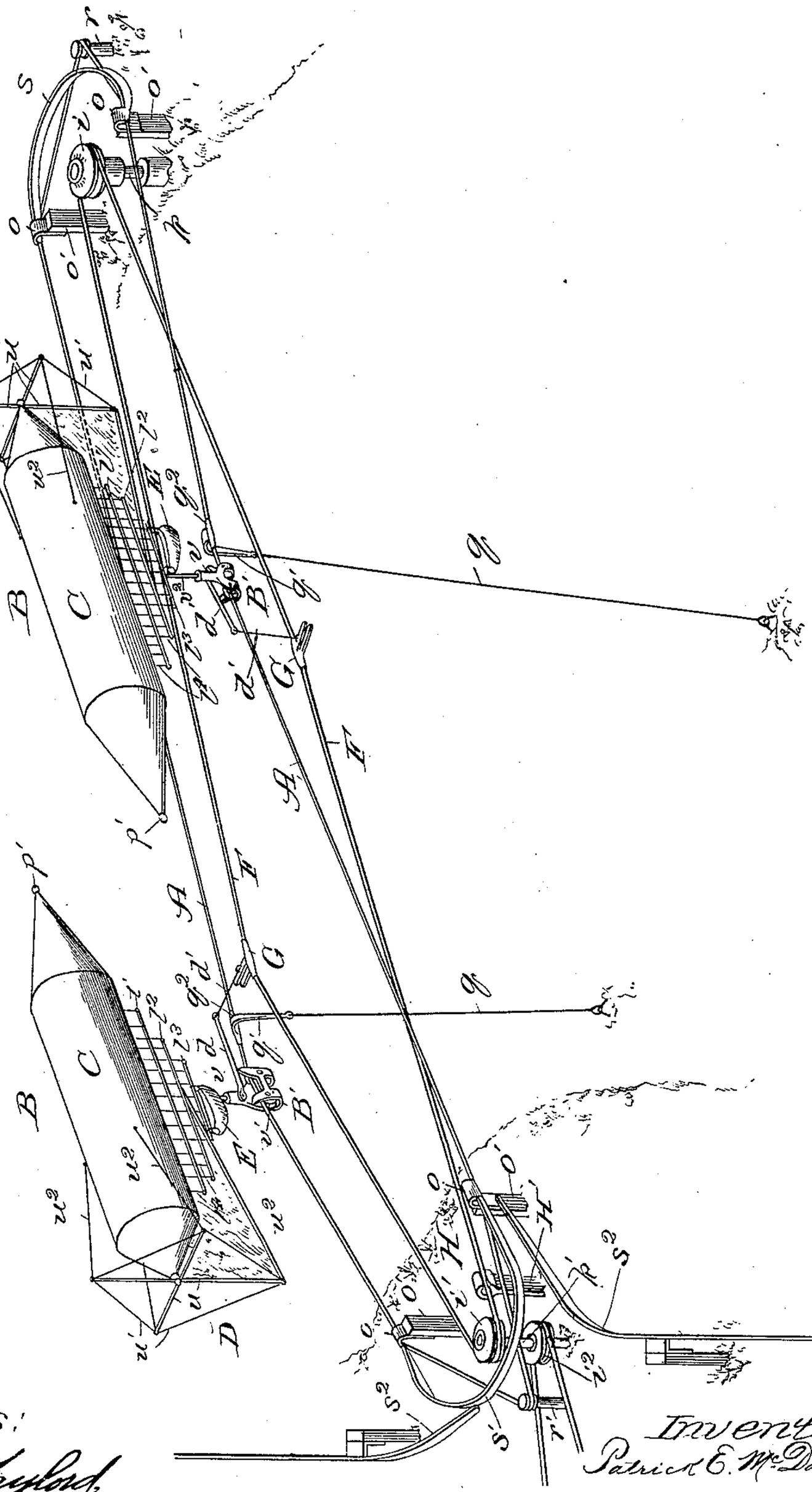
(No Model.) 3 Sheets—Sheet 1.

P. E. McDONNELL.

METHOD OF AND APPARATUS FOR TRANSPORTATION.

No. 446,786. Patented Feb. 17, 1891.



Witnesses:
Chas. S. Shaylor,
Clifford M. White.

Inventor:
Patrick E. McDonnell,
By Dyrenforth & Dyrenforth,
Attys.

(No Model.) 3 Sheets—Sheet 2.

P. E. McDONNELL.

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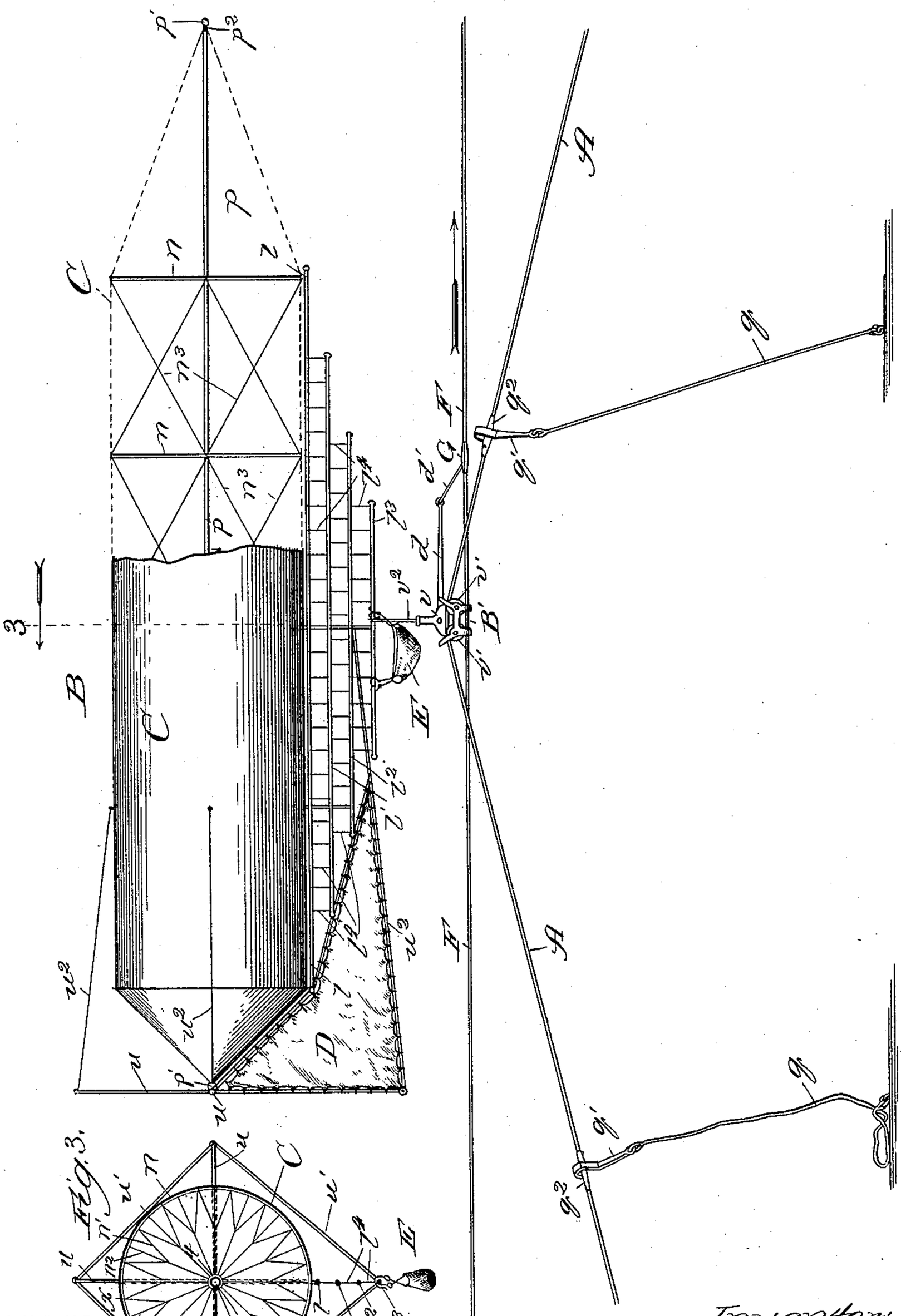

Fig. 2.

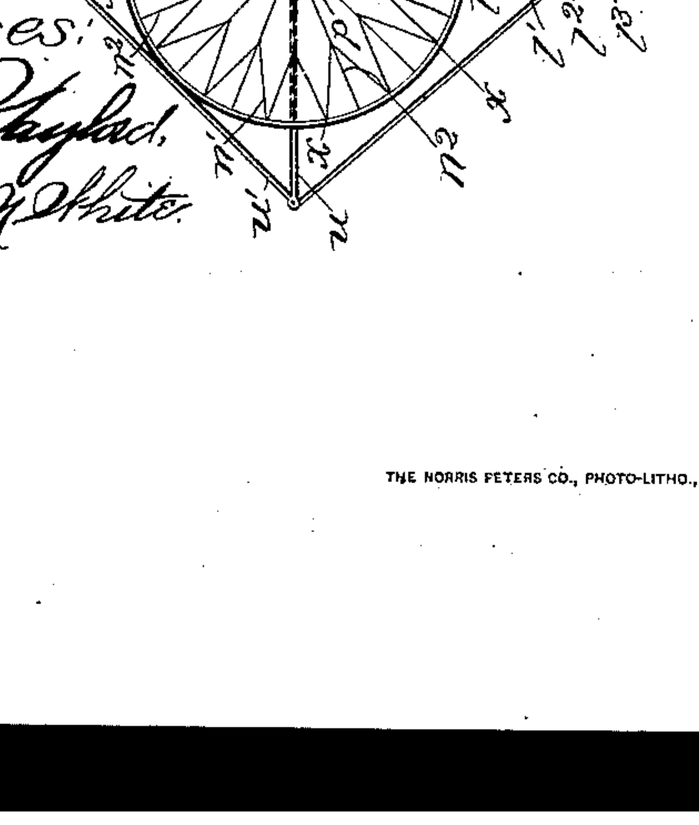

Fig. 3.

Witnesses:
Chas. E. Shepard,
Clifford N. White.

Inventor:
Patrick E. McDonnell,
By Dyrenforth and Dyrenforth,
Attys.

(No Model.) 3 Sheets—Sheet 3.

P. E. McDONNELL.

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Fig. 4.

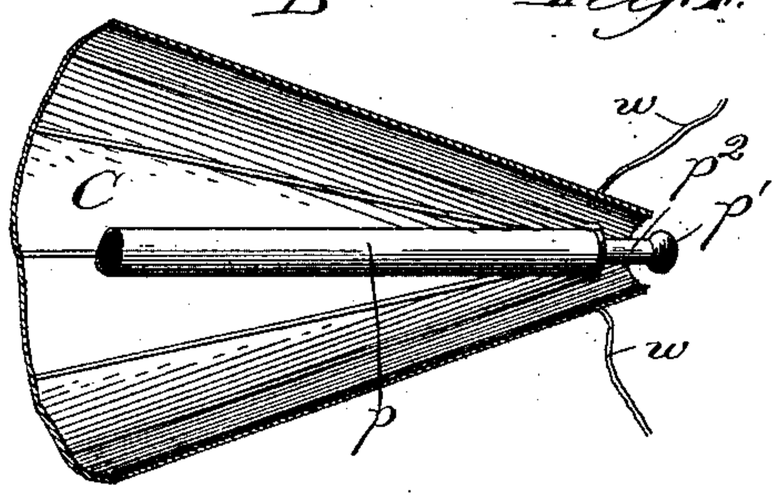


Fig. 5.

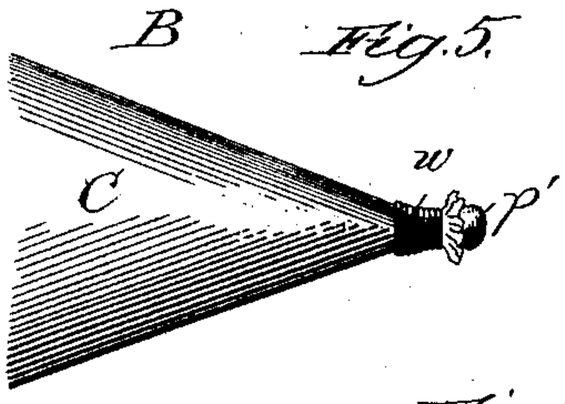


Fig. 6.

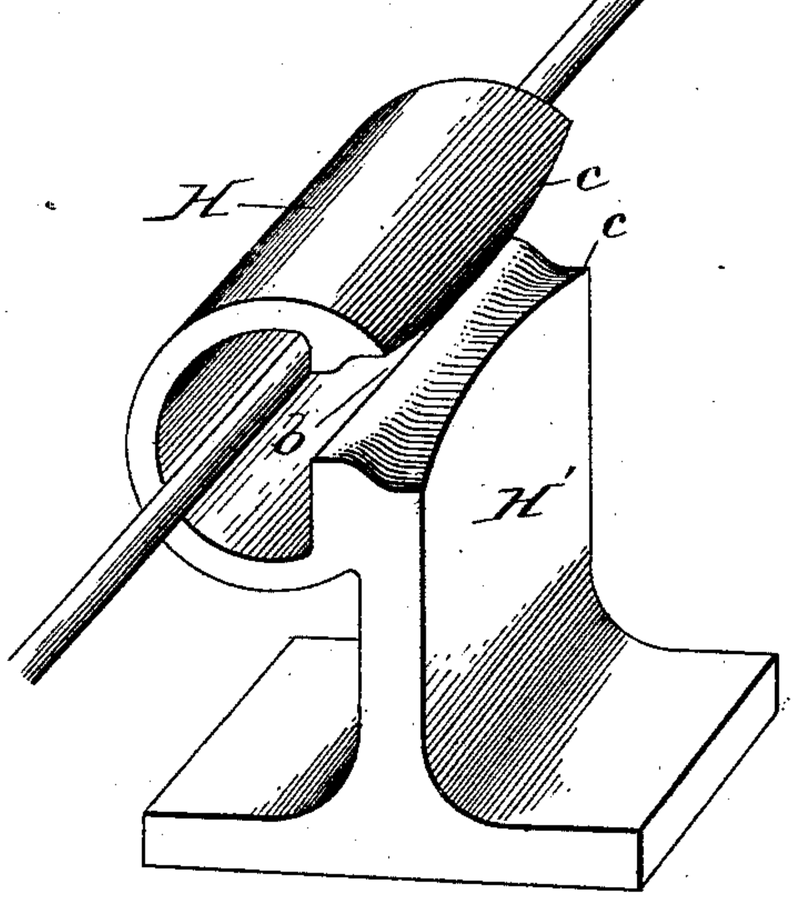
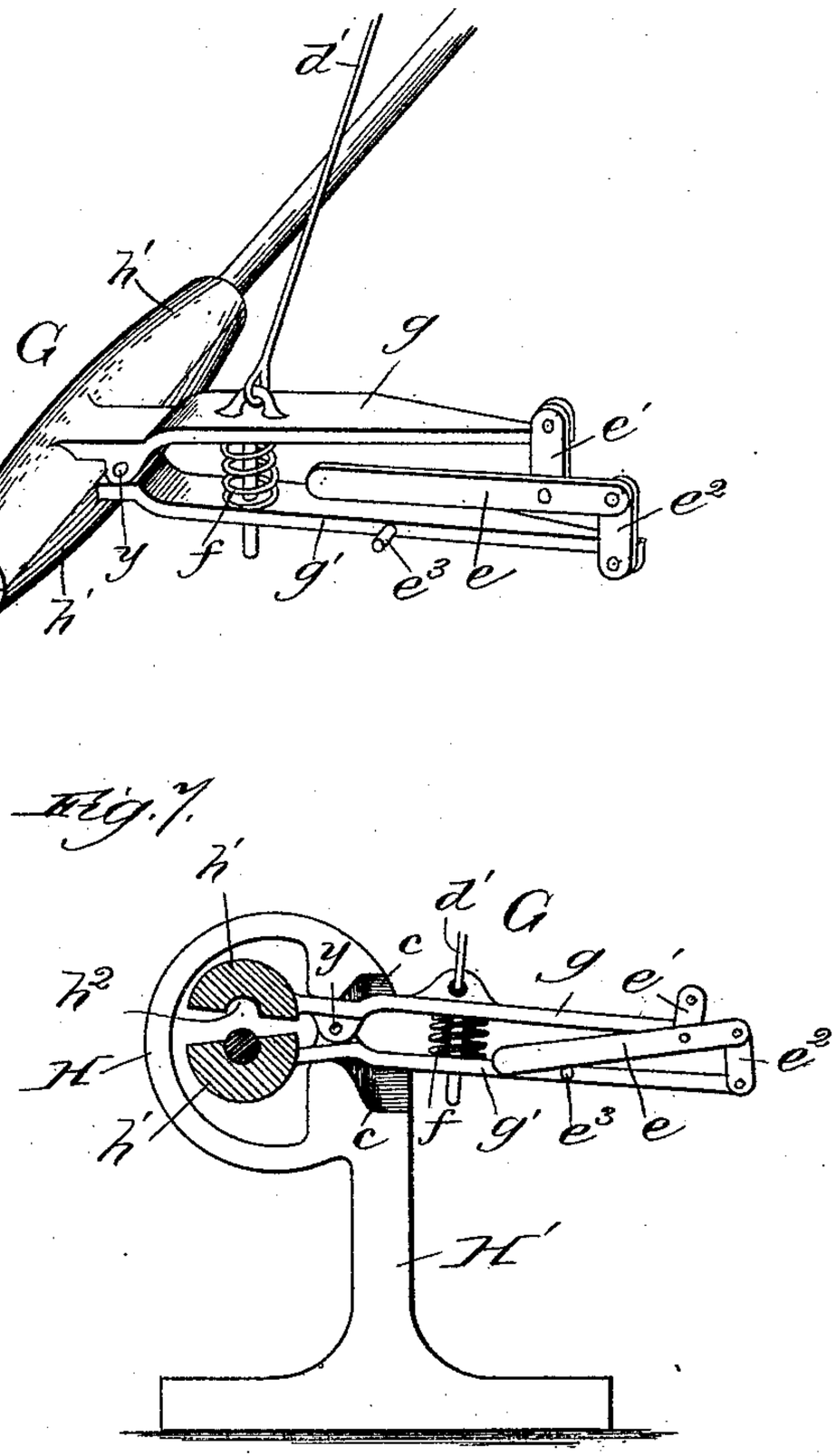


Fig. 7.



Witnesses:
Chas. E. Gaylord,
Clifford M. White.

Inventor:
Patrick E. McDonnell,
By Dyrenforth & Dyrenforth,
Attys

UNITED STATES PATENT OFFICE.

PATRICK E. McDONNELL, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO L. H. WILSON, OF SAME PLACE.

METHOD OF AND APPARATUS FOR TRANSPORTATION.

SPECIFICATION forming part of Letters Patent No. 446,786, dated February 17, 1891.

Application filed September 25, 1890. Serial No. 366,102. (No model.)

To all whom it may concern:

Be it known that I, PATRICK E. McDONNELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Apparatus for Transportation, of which the following is a specification.

The object of my invention is to provide for the convenient transportation of bodies by elevated or overhead routes by counteracting the attraction of gravitation upon the object to be transported and confining and guiding it upon the course along which it is propelled.

To this end my invention consists in the general construction of my improved apparatus.

It further consists in combinations of parts and details of construction, illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view, in the nature of a diagram, representing my improvement as operatively applied, say, for the purpose of transporting ore from a mine to the base of a mountain; Fig. 2, a similar view of the apparatus, but broken and enlarged; Fig. 3, a section taken on the line 3 of Fig. 2 and viewed in the direction of the arrow. Figs. 4 and 5 are broken views showing details of construction of the balloon. Fig. 6 is a broken perspective view showing other cooperating details, and Fig. 7 a sectional view illustrating the grip in position on the endless carrier-cable and the means for automatically releasing it.

My invention is adaptable for use to many different purposes of transportation, as for the carriage of passengers, freight, and the like, thus to provide a medium of transportation analogous to the elevated railway, and it is my intention to be understood as claiming it for all such and other purposes to which it may be applied, as well as to that of transporting ore, as hereinbefore mentioned.

Having originally designed my invention for the purpose of affording a convenient method, and an inexpensive one compared with the methods hitherto employed, for removing ore from a mine to a desired point down the mountain containing it, the description hereinafter contained is mainly confined to that particular application, and this for the further reason that explanation of my invention in the particular connection with a mine will suffice to render comprehensible to those skilled in the art to which it relates its use and application for other purposes.

A general statement of the plan is as follows: The material or body to be transported is attached to a balloon sufficiently buoyant to counteract or more than counteract the attraction of gravitation upon itself and the load attached to it, and the balloon is retained against escaping from and is guided to follow a desired course, along which it is preferably propelled mechanically in contradistinction to being propelled by the force of air-currents, though there may be conditions under which air-currents may be relied on wholly or in part to drive the balloon with its load.

Following is a detailed description of my improved apparatus, as illustrated in the drawings.

A is a guide-cable, which should be endless and which extends between the points of loading and unloading, thus between a mine and the base or other point down the side of a mountain. The cable A is strung between posts r and r' near the termini of the course and is sufficiently slack to extend throughout a considerable portion of its length on the surface of the ground, being anchored at intervals by guy-ropes q, fastened to the ground and provided at their free ends with goose-neck-shaped arms q', each terminating in a sleeve q^2, surrounding the guide-cable A. Near the opposite ends of the guide-cable course are rigid curved switches s and s', connecting opposite sides of the course short of the points r and r', between which the cable q is strung, and extending from guides o, open at their under sides to admit the carriage B′ to the cable A, which passes through the guides, the latter being secured to extend laterally from the upper ends of posts o', suitably located. (See Fig 1.)

I construct the balloon B especially with a view to adapting it to my purpose by rendering it strong and light and of distributing the weight of the load it has to carry over the entire structure. It is preferably in the form

of a cylinder, having conical ends and built upon a center pole p, extending lengthwise through it and which should be hollow and provided with knobs p' at its opposite ends and with offsets p^2 adjacent to the knobs. At intervals surrounding the center pole p are hoops n, within each of which is a cord n', considerably longer than the inner circumference of the hoop. The cord n' is secured at intervals, as indicated at x in Fig. 3, to the inner side of the hoop, leaving it to form loops between the points x, centrally between each adjacent pair of which points is fastened one end of a stay-cord n^2, having its opposite end fastened to a ring t, surrounding the center pole, and being fastened between its extremities to the respective loop in the cord n' in a manner to stretch it taut. By this manner of fastening the interior of each hoop presents the star-shaped appearance shown in Fig. 3. The structure is further strengthened by the cords n^3, (shown in Fig. 2,) which extend diagonally between the hoops and serve to take strain off the covering C in pulling the frame structure taut. The covering C is formed of a suitable fabric, as muslin, rendered gas-tight and stretched over the frame structure, being led from the outermost or end hoops n, and suitably formed to produce the tapering ends of the balloon, to the offsets p^2, where cord w is bound around it to tightly fasten it. The end of the balloon intended to form the head should be, as shown, more tapering than the opposite or rear end, at which are provided suitable keels D for keeping the air-ship against the wind. These keels are formed with rods u, secured at their centers in a manner to extend at right angles to or to cross each other to the rear end of the center pole p and secured together by a cord u' and fastened to the frame of the balloon by guy-ropes u^2.

Below the balloon is suspended a rod l, extending the length thereof and close to it. From the rod l a shorter rod l' is suspended. From it a still shorter rod l^2, and from the latter a still shorter rod l^3, the means of suspension being rods or cords l^4, tying the poles together at intervals in the manner clearly indicated in Fig. 2, and the rods being in such relative positions as to cause their longitudinal centers to coincide.

On the lowermost rod l^3 the body or weight to be transported is suspended, that shown being an apron or hammock shaped receptacle E for holding ore, though it might be a car, a basket, or other form of receptacle adapted to serve a particular purpose.

The provision and manner of connecting the rods below the balloon serve, as will be seen, to distribute the weight of the load in the receptacle over the frame structure of the balloon, and avoid the necessity of providing the netting usually provided on a balloon.

From the lowermost distributing-rod l^3 is also suspended the guide-carriage B′, which partakes somewhat of the nature of a trolley device, being formed of a bearing v for guide-pulleys v', preferably two in number, as shown, though one may suffice, and the guide-cable A bears on the pulleys which thus are applied to it from underneath. The bearing v is suspended through the medium of a rod v^2, connected with the bearing by a swivel-joint, whereby the balloon may always, like a weather-vane, assume the position of presenting its sharp point to the wind.

If the wind be alone depended on to propel the balloon, as it proceeds under the propelling influence, it will rise, picking up by the carriage B′ the guide-rope until the latter is raised above the ground as far as the guy-ropes q will permit, and be confined against rising further by the confinement of the rope A, and in its propulsion it is guided by the rope A, the buoyancy of the balloon causing the carriage always to remain in contact with the rope, or a sleeve q^2 thereon. When the carriage B′ reaches either end of the course, by one side thereof, it is switched off upon a switch s or s', and thereby directed to the opposite side.

As it may be desired to remove balloons from the course to take them out of the way of others thereon, I provide branch switches (indicated at s^2) for that purpose.

As hereinbefore suggested, the preferred plan is to propel the balloon mechanically, and to that end I provide the following-described mechanism: F is an endless cable extending in the course of the cable A, being stretched to pass around and extend between pulleys i and i' on shafts k and k' at its opposite ends, the shaft k' being rotary and provided also with a drive-pulley i^2, from which it is geared to suitable driving-power. (Not shown.) The balloon is separable connected with the cable F from the bearing v of its carriage B′ through the medium of a gripping device or clutch G. The device G comprises a sleeve h, Fig. 6, formed in two parts h', Fig. 7, each having a semi-cylindrical groove h^2, of such a diameter with relation to that of the cable F that when the two parts are clamped together and their grooves h^2 form together an opening, the cable will be tightly held in the sleeve. The parts h' form jaws on the ends of handles, g and g' hinged together, as shown at y, Figs. 6 and 7, near the jaws, which are normally maintained apart by a spring f confined between the handles and tending normally to bring them toward each other to open the jaws. On the outer end of the handle g is a link e', and on the corresponding end of the handle g' is a similar link e^2. A lever e is pivoted at one end to the free end of the link e^2, and between its extremities to the free end of the link e', and it extends across a stud e^3, projecting laterally from the arm g'. The grip G is suspended on a rod d, extending from

the bearing *v* of the carriage B′, through the medium of a link *d′*. Thus, as will be seen, when the grip G clutches the traveling cable F the latter propels the balloon with its load along the course, which may be formed with a light structure, because of the lack of gravity-strain upon it.

I provide for automatically bringing the balloon to a standstill at desired points, as at or near the lower end of the course shown in Fig. 1. H is a hollow cylindrical head, through which the cable F passes, being provided on the upper end of a suitably located standard H′. Its outer side is slotted longitudinally, the opposite sides of the slot being convex, as shown at *c* in Figs. 6 and 7, to bring them closer together between their extremities than are normally the arms *g* and *g′* of the grip, while toward the said extremities they are wider apart than the arms to admit the latter. Thus when in the travel of the cable F a grip G reaches the head H the arms *g* and *g′* freely enter the slot *b* of the head, but as they proceed therein toward its constricted part the latter presses the arms together, thereby opening the jaws *h′* and permitting the traveling cable to pass between them without carrying them along, whereby the balloon is brought to a standstill. When it is desired to allow the balloon to proceed, the grip is forcibly removed from the holder H. The lever *e* also affords a medium through which to release the grip at will from the cable F, which may be accomplished by pulling it downward and adjusting it at its free end below the stop e^3, whereby the arms *g* and *g′* are brought together and the jaws *h′* as a consequence separated.

For the sake of clearness I have deemed it advisable to show and describe herein the details of the construction of the balloon B, believing that construction to be best for my present purpose, though it may be accomplished with differently-constructed balloons. At the same time I believe that I am not entitled to claim the construction of the balloon by itself in the present specifiation, though I do not wish to abandon it to the public, as features of that construction are very desirable for an air-ship of my invention for use without the guidance and confinement forming the gist of my present invention. Hence, though such features are herein shown and described, I reserve the right to claim them as parts of such an air-ship in a future application for Letters Patent.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an apparatus for transporting a load, the combination of an anchored guide-cable A, extending along the course of transportation, and a balloon B, having a cylindrical body provided with tapering ends and having a swiveled connection with and movably confined upon the guide-cable and adapted to have applied to it the load to be transported, substantially as described.

2. In an apparatus for transporting a load, the combination of an anchored guide-cable A, extending along the course of transportation, and a balloon B, having a cylindrical body and tapering ends and provided with keels D at one end, the balloon being movably confined upon the guide-cable and adapted to have applied to it the load to be transported, substantially as described.

3. In an apparatus for transporting a load, the combination of an anchored guide-cable A and an endless traveling cable F, extending along the course of transportation, a balloon B, formed with a cylindrical body provided with tapering ends and adapted to have applied to it the load to be transported and attached to the cable F, and a carriage B′, suspended from the balloon and engaging the guide-cable and a swivel-joint in the suspending medium of the carriage, substantially as described.

4. In an apparatus for transporting a load, the combination of an endless slack-anchored guide-cable A, having switches near opposite ends, and an endless traveling cable F, extending along the course of transportation, a balloon B, adapted to have applied to it the load to be transported and separably attached to the cable F, and a carriage B′, suspended from the balloon and engaging the guide-cable, substantially as described.

5. In an apparatus for transporting a load, the combination of an endless slack guide-cable A and an endless traveling cable F, extending along the course of transportation, guy-ropes *q*, having at their free ends arms *q′*, terminating in sleeves q^2, surrounding the guide-cable, a standard H′, having a head H, through which the cable F passes, posts *o′* near opposite ends of the course, and having heads *o*, through which the cable A passes, switches *s* and *s′* between posts *o′*, a balloon B, adapted to have applied to it the load to be transported, a grip G, separably connecting the balloon with the cable F, and a carriage B′, suspended from the balloon and engaging the guide-cable, substantially as described.

6. An apparatus for transporting a load, comprising, in combination, an endless slack guide-cable A and an endless traveling cable F, extending along the course of transportation, pulleys *i* and *i′* at opposite ends of the cable F, around which the said cable passes, and one of which is geared with the driving-power, a standard H′, having a head H, through which the traveling cable passes, and provided with a slot *b*, contracted toward its longitudinal center, guy-ropes *q*, having at their free ends arms *q′*, terminating in sleeves q^2, surrounding the guide-cable, posts *o′* near opposite ends of the course and having heads *o*, through which the cable A passes, switches *s* and *s′* between posts *o′*, a balloon B, adapted to have applied to it the load to be transported, a carriage B′, swiveled to a rod v^2, depending from the balloon and engaging the

guide-rope, and a grip G, suspended from the carriage and comprising jaws h' to clamp the cable F on hinged arms g and g', controlled by a spring f, confined between them, links e' and e^2 at the outer ends of the arms, a lever e, pivotally connected with the links at their free ends, and a stop e^3 on the arm g' to be engaged by the lever, the whole being constructed and arranged to operate substantially as described.

PATRICK E. McDONNELL.

In presence of—
J. W. DYRENFORTH,
M J. FROST.