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2 SHEETS-SHEET 1.



WITNESSES  
J. C. Cheney  
D. E. Hardenbergh, Jr.

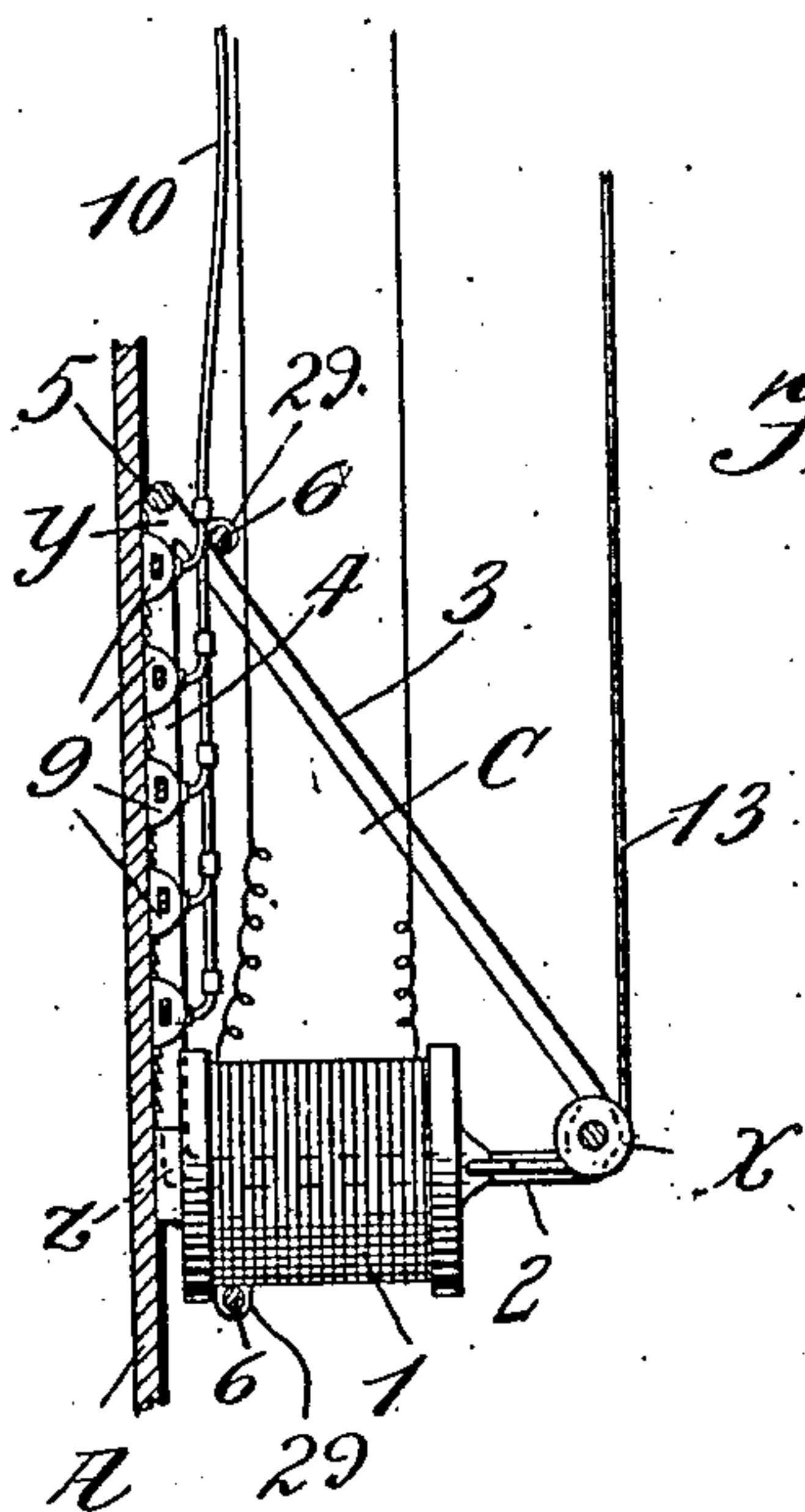
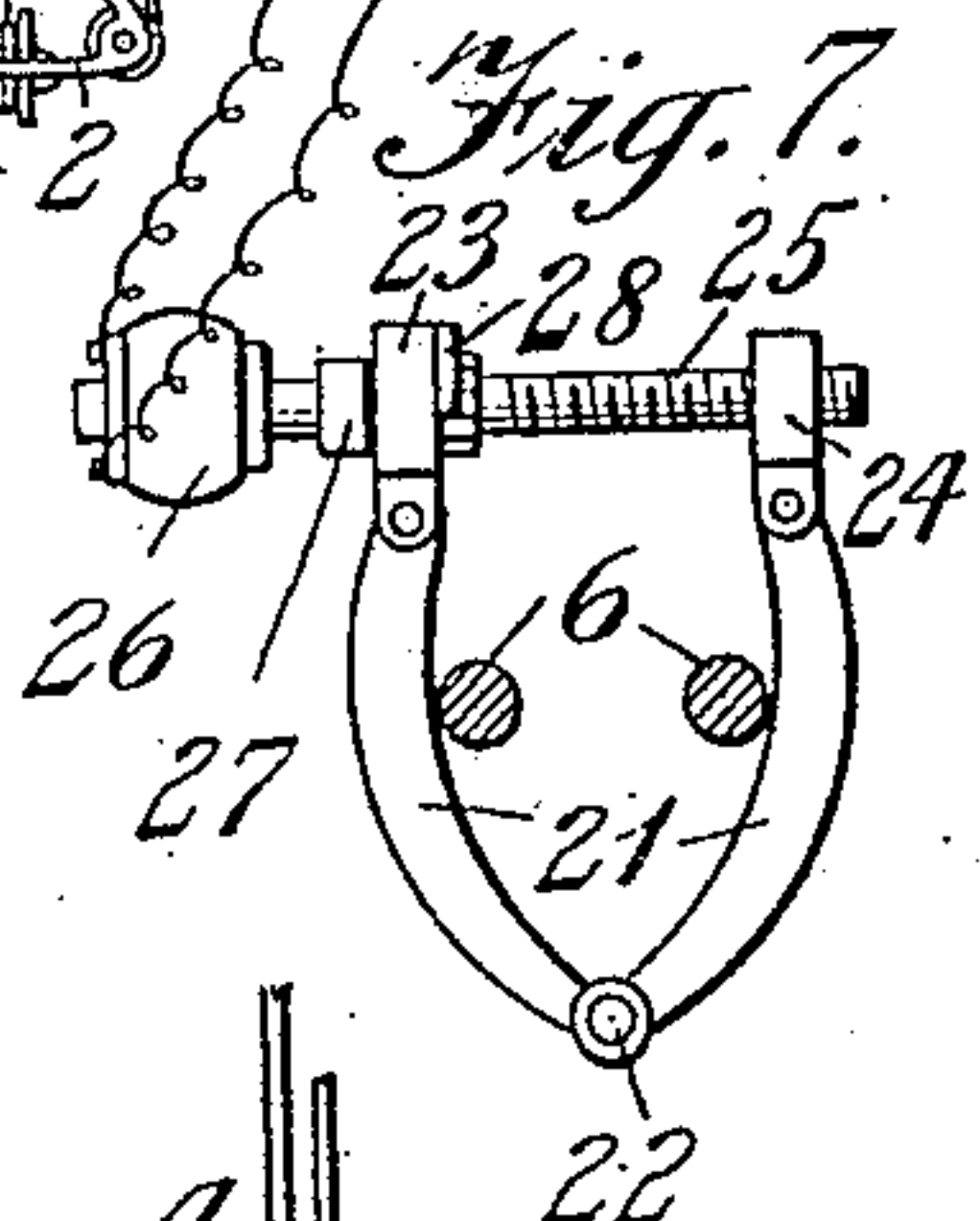
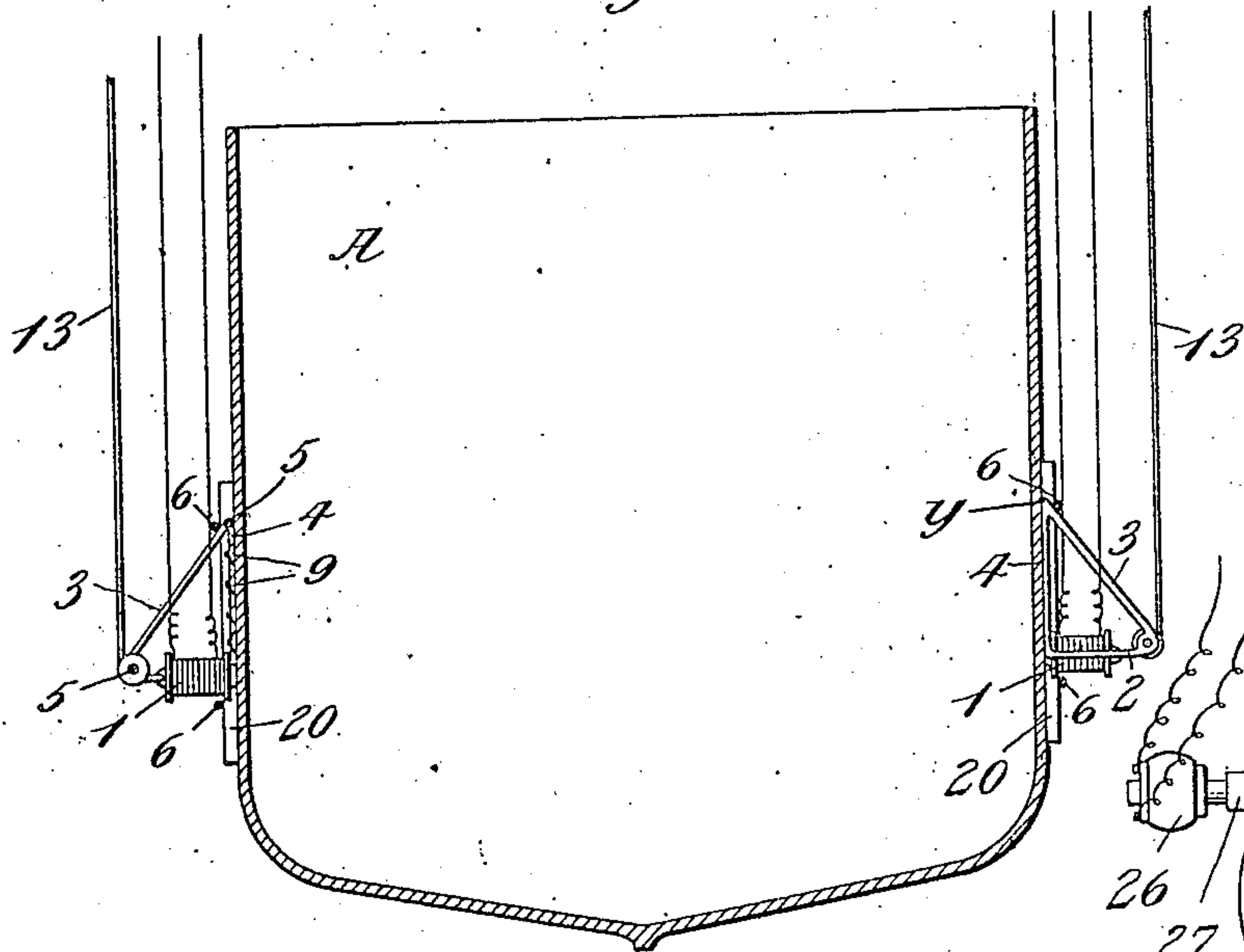
Bainbridge Percy Clark  
BY *Gifford & Bull*  
ATTORNEYS

B. P. CLARK.  
 APPARATUS FOR RAISING SUNKEN VESSELS.  
 APPLICATION FILED MAR. 18, 1909.

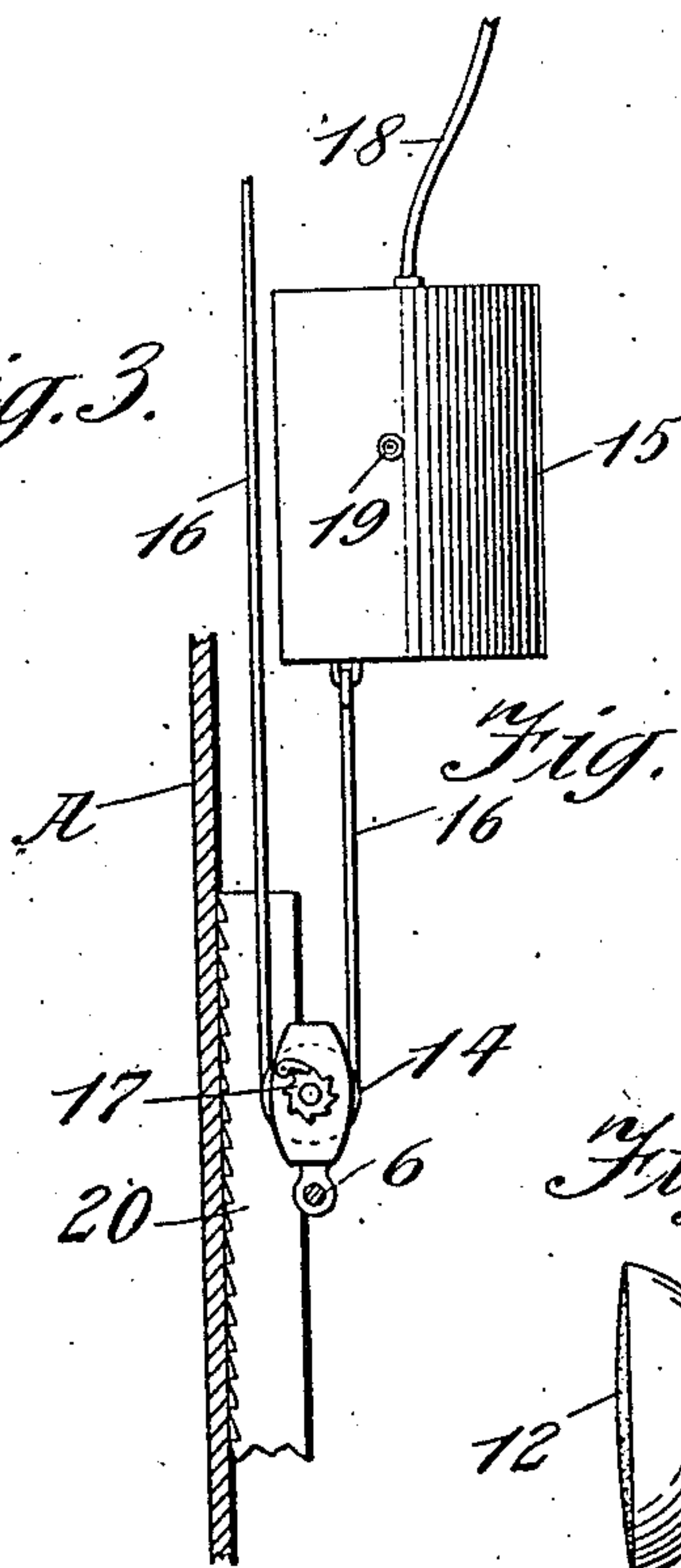
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Patented Apr. 19, 1910.  
 2 SHEETS—SHEET 2.

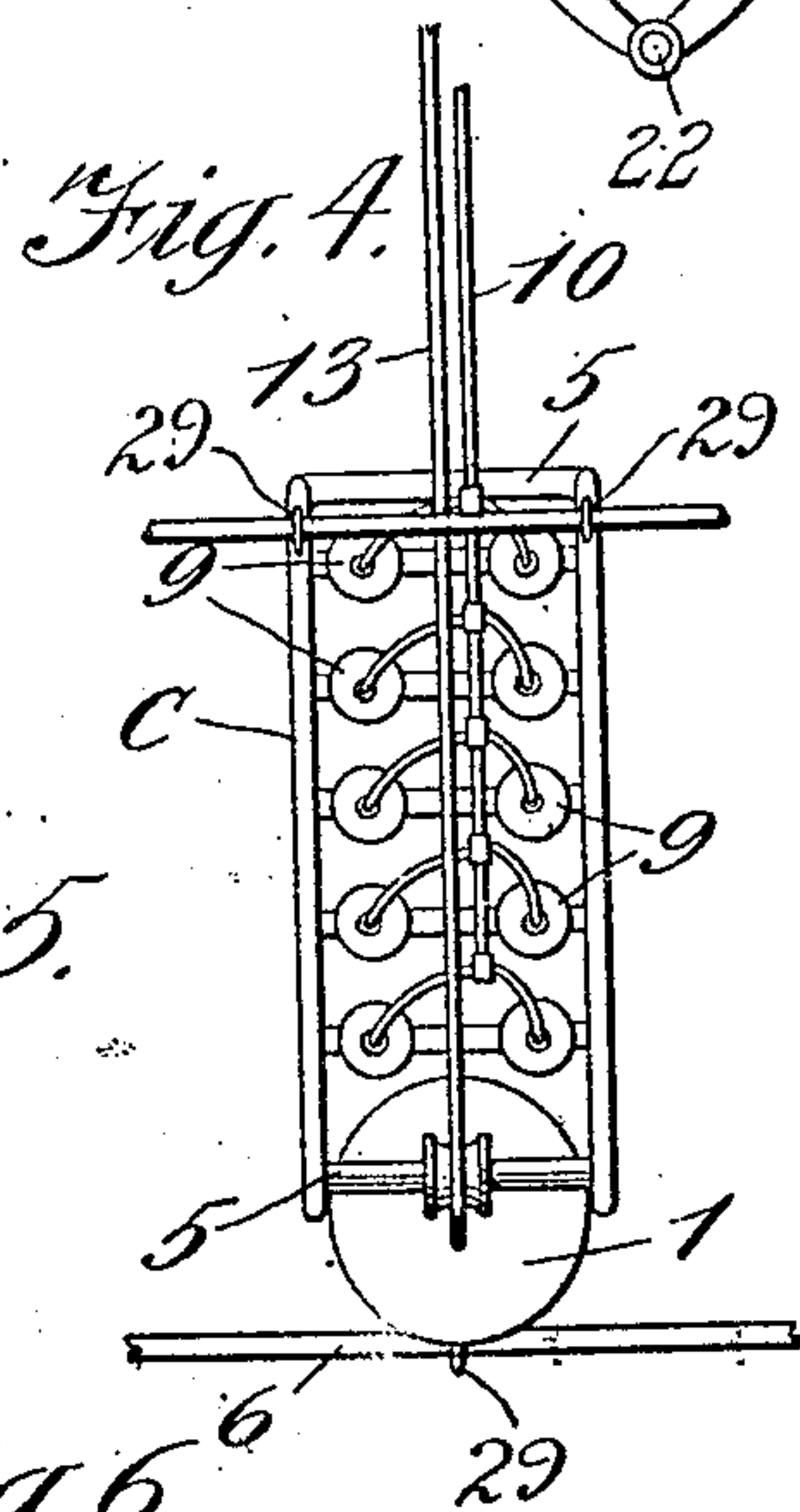
*Fig. 2.*



*Fig. 3.*

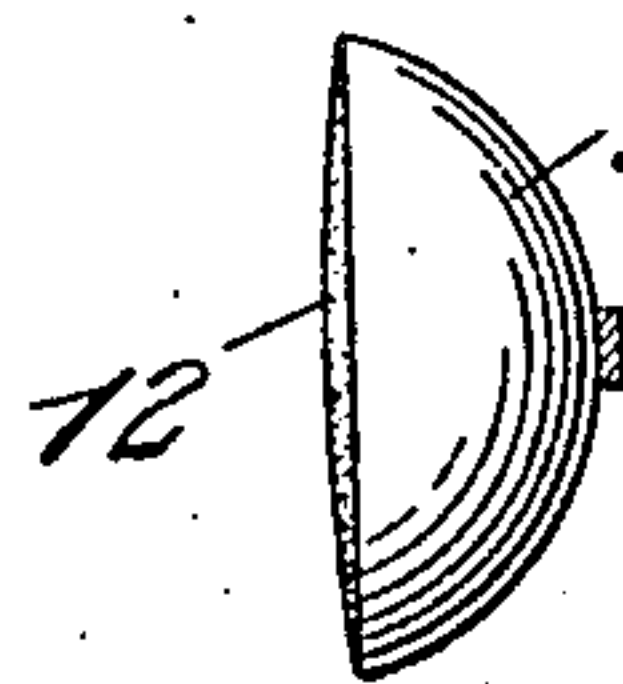


*Fig. 5.*



*Fig. 4.*

*Fig. 6.*



WITNESSES  
*E. J. Cheney*  
*D. C. Hardinbergh, Jr.*

INVENTOR  
*Bainbridge Percy Clark*  
 BY  
*Gifford & Bull*  
 ATTORNEYS



# UNITED STATES PATENT OFFICE.

BAINBRIDGE PERCY CLARK, OF ELIZABETH, NEW JERSEY.

## APPARATUS FOR RAISING SUNKEN VESSELS.

955,763.

Specification of Letters Patent.

Patented Apr. 19, 1910.

Application filed March 18, 1909. Serial No. 484,140.

*To all whom it may concern:*

Be it known that I, BAINBRIDGE PERCY CLARK, a citizen of the United States, and a resident of the city of Elizabeth, county of Union, State of New Jersey, have invented certain new and useful Improvements in Apparatus for Raising Sunken Vessels, of which the following is a specification.

In proceeding to raise sunken vessels it has heretofore generally been the practice to pass chains or cables under the hull of the vessel and to exert a lifting strain on such chains or cables by means of caissons or the like or suitable hoisting apparatus. Such a method, while in many instances successful, offers great difficulties in instances where a vessel is located at a great depth, making it impossible for divers to place the chains in position, or where there are obstructions on the bottom around the vessel, or the latter has become embedded in the bottom through the piling of sand, etc., around it by the action of the water or through its weight.

It is the purpose of my invention to provide apparatus for raising sunken vessels adapted for use at any depth, capable of use whether or not the vessel is embedded in the bottom of the body of water in which it is submerged, and in the use of which the services of divers are not required.

My invention is more especially adapted for use in connection with vessels of steel, iron or other metal, or having their hulls wholly or partially covered or sheathed with the same, but in connection with wooden vessels my invention is capable of an efficient although more limited use as will hereafter be pointed out.

In the drawings herewith I have shown and will hereafter describe a preferred form of apparatus for carrying out my invention but I do not desire to limit myself to such preferred form but to cover my novel method and any apparatus for carrying out the same as set forth in and falling within the scope of the claims hereto appended.

Like characters of reference denote like parts in all the figures of the drawings herewith.

Figure 1 represents a side view in elevation of a sunken vessel with the preferred form of apparatus for carrying out my invention in place. Fig. 2 represents in elevation a sectional view taken transversely of the vessel. Fig. 3 represents a detail side view in elevation of a magnet, supporting

frame and attached parts. Fig. 4 represents a detail end view in elevation of parts as shown in Fig. 3. Fig. 5 represents a detail side view in elevation of the manner of attaching a caisson to a cable around the vessel. Fig. 6 represents a detail view of a preferred form of sucker. Fig. 7 represents a detail view of a preferred form of chain or cable clamp.

I will now describe in detail the preferred form of apparatus for carrying out my invention.

Reference letter A denotes a sunken vessel of iron, steel, or other metal, which is to be raised, B denotes various scows or other boats located above the wreck upon which is placed the necessary hoisting apparatus, engines, electrical generating apparatus, etc. I first proceed to sink cables or chains longitudinally around the sunken vessel in the following manner; an electric magnet 1 is mounted in a frame C which in the form shown is triangular with sides 2, 3 and 4, the magnet 1 being mounted lengthwise of the shortest or lower side 2; the frame C is preferably double as shown in Fig. 4, the separate frames therein being joined by cross bars 5 and the whole being formed of wood or preferably of metal.

While triangular in the form shown frames C may be of any desired and suitable shape or construction and may be used in any number necessary and required for the work in hand. Connecting the various frames C used are cables or chains 6, preferably two in number with the triangular frame C as shown, one cable passing under the frame adjacent the vertical side and a second being positioned at the upper angle of the frame. The sides 4 of frames C or those which are designed to rest against the vessel are roughened or formed with teeth adapted to firmly engage with the vessel when the frames are in position, and while in the present instance the vessel A is shown with substantially perpendicular sides, should the same be rounded or in other form the sides 4 of the frames C should be shaped to conform as nearly as may be to the shape of the vessel.

The frames and magnets, suitably spaced apart, together with the cables or chains, are sunk down around the vessel, the cables or chains being continuous around one end thereof; in this instance the bow, and at the other end being secured, to suitable winch



heads or winding devices 7 on electric motors 8 which are adapted to be submerged with the cables or chains and supplied with power from above. When the frames C are in a suitable position adjacent the vessel the power is turned on in the electric magnets 1 through connections with the scows B above, and the magnets attach themselves to the hull of the vessel, the frames C being securely positioned in contact therewith. Any slack of the cables or chains 6 is then taken up and the same are drawn taut around the hull by means of the motors 8; to permit of this operation the cables are so secured to the frames C that they may run freely through their bearings thereon. This connection between the cables or chains and the frames and magnets is preferably by means of rings 29 secured on the frames and magnets through which the cables pass, as shown in Figs. 3 and 4. In the form of apparatus shown the chains or cables are tightened by being wound upon winch heads 7, but they may be tightened if desired by securing them to the winch heads or to the motor shafts in such a manner that the chains or cables are merely twisted or turned and the slack thus taken up. Should the hull of the vessel be rounded this tightening of the cables or chains will prevent the same from slipping up over the bulge of the vessel when a lifting strain is brought upon the cables. After being tightened the chains or cables are preferably clamped as will hereafter be described.

The frames, magnets and cables being in place, the lifting operation may be commenced either by ropes or chains attached to the magnets or to the cables or both, and drawn up from above, but it is a well known fact that when a magnet is attached to a surface should a side pull be exerted on the magnet, it will tend to slip or slide over the surface to which it is attached; therefore, were the pull to be exerted directly from above on the magnets, it would tend to slide the magnets and frames up on the sides of the vessel without raising the same; to overcome this difficulty I have provided in several ways:

First, by the cables or chains surrounding and pulled taut around the vessel and connected to the frames.

Second, by the roughening or forming with teeth of the sides 4 of the frames in contact with the vessel.

Third, secured to said sides 4 of the frames and to the cross bars 5 joining the same may be placed a plurality of cup-shaped members or suckers 9; the mouths of these suckers are preferably closed by a covering or diaphragm which will break when the suckers are forced against the side of the vessel liberating a portion of the air contained therein and causing the suckers to

adhere or cling to the side of the vessel; or the suckers may be operated by connecting them by pipe or tube 10 with a pump 11 above and exhausting the water from the suckers after they are in position against the vessel. In Fig. 6 is shown in detail a sucker 9 of leather, rubber or other suitable material the mouth of which is closed by a cover or diaphragm 12 preferably of rubber, convex to the sucker, and adapted to break when forced against the vessel. It will readily be seen that as each magnet is energized the frame to which it is attached and the suckers carried by the frame are brought into position against the side of the vessel, as shown in Fig. 3, and the forcing of the suckers against the side of the vessel by action of the magnet and also by reason of the tightening of the chains or cables around the vessel, serves to break the sucker coverings or diaphragms, releasing a portion of the air contained therein, the suckers thereupon clinging to the side of the vessel. This method of positioning the suckers by the use of a magnet has been found to be preferable.

Fourth, the hoisting rope or chain 13 is secured at the outer lower angle of the frame C as denoted by  $x$  and it will readily be seen that when a pull is exerted from above on the rope 13, the frame C will form a lever, the fulcrum of which is at the upper angle at a point denoted  $y$ , the pull of the magnet on the vessel being thus exerted in a direction perpendicular thereto at point  $z$  and there being no side pull to cause the magnet to slip or slide.

As a further means of lifting the sunken vessel ropes or chains may be fastened directly to the cables or chains 6 and operated from above, or chain pulleys 14 formed with teeth or other suitable means for engaging with the chains may be secured thereto and caissons 15 drawn down by means of chains 16, the pulleys 14 being checked against operation to permit the caissons to rise to the surface by means of a pawl and ratchet 17 or other suitable means. The caissons 15 may be lowered filled with compressed air, or may be lowered filled with water and the water pumped out or forced out by compressed air from above through pipe or tube 18; in the latter case it is preferable to provide the caissons with a valve 19 which is adjusted to retain the air in the caisson under a certain pressure of water and in such case when the caisson is lowered to any great depth and being supplied with compressed air to withstand the water pressure at such depth is then raised, the valve will operate as the pressure of the water is decreased and lower the pressure of the air within the caisson to prevent its being burst from such pressure.

To more evenly distribute the strain over the vessel which is being raised, it is preferable



that beams 20 of wood or metal be inserted under the cables 6, the side in contact with the vessel being roughened or formed with teeth to prevent slipping.

5 In Fig. 7 is shown a preferred form of clamping device for securing each of the chains or cables 6 after it has been tightened around the vessel. Around each of the chains or cables 6 adjacent the tightening  
10 motor 8 is placed a clamp formed of side arms 21 pivoted at 22 and provided at the top with lugs or ears 23 and 24 through which is passed a threaded bolt 25; at one end the bolt 25 is secured to or integral with  
15 the shaft of a motor 26 the opposite end of the bolt being threaded in lug 24 and adjustable therein, lug 23 being smooth bored and the bolt 24 held in position with respect thereto by a shoulder 27 on the bolt. Upon  
20 the operation of the motor the sides of the clamp are drawn together by the turning of bolt 25, to clamp the chain, the bolt being prevented from turning in a direction to loosen the clamp by means of a ratchet on  
25 the bolt and pawl 28 on lug 23.

It will readily be seen that the number of frames, magnets, chains or cables attached to the frames and surrounding the vessel, lifting ropes or chains, caissons, etc., may be as  
30 desired and that two or more sets of frames, magnets and chains, one in place above the other, may be used as desired.

The operation of my improved apparatus will be readily understood from the foregoing description thereof and after the vessel  
35 has been raised clear of the bottom on which or in which it has been resting, chains may be passed under the vessel if desired to further assist in raising the same.

40 In connection with wooden vessels no use could be made of magnets designed to attach themselves to the hull of the vessel but chains, etc., may be placed around the vessel, tightened and used in raising wooden vessels  
45 in such instances where the weight of the vessel, the depth to which it is sunk or other circumstances do not render this limited use of my invention impossible.

Having thus described my invention, what  
50 I claim as new and desire to secure by Letters Patent of the United States is:—

1. An apparatus for raising a sunken vessel, comprising a chain or cable adapted to be lowered around the vessel, and means  
55 for positioning the chain or cable around and adjacent to the vessel comprising an electrical magnet secured to said chain or cable, and means for energizing the magnet when in a lowered position.

60 2. An apparatus for raising a sunken vessel, comprising a supporting frame, a cable secured to the frame adapted to be lowered around the sunken vessel, and means for positioning the chain or cable around and  
65 adjacent to the vessel, comprising an elec-

trical magnet carried by said frame, and means for energizing the magnet when in its lowered position.

3. An apparatus for raising a sunken vessel, comprising a chain or cable adapted to  
70 be lowered around the vessel, and means for positioning the chain or cable around and adjacent to the vessel comprising an electrical magnet secured to said chain or cable, means for energizing said magnet when in  
75 its lowered position, and means for tightening said chain or cable around the vessel.

4. An apparatus for raising a sunken vessel, comprising a frame, an electrical magnet mounted on said frame adjacent the lower  
80 side thereof and adapted to be lowered adjacent the vessel, means for energizing the magnet when lowered to cause it to attach itself to the vessel, one side of the frame being adapted to rest against the vessel, and  
85 means for exerting a lifting pull on the magnet, the upper portion of the side of said frame which is against the vessel being adapted to act as a fulcrum to cause the pull of the magnet to be perpendicular to  
90 the vessel.

5. An apparatus for raising a sunken vessel, comprising a triangular frame, an electrical magnet mounted on the lower side of  
95 said frame and adapted to be lowered into position adjacent the vessel, and means for energizing the magnet when in its lowered position, said magnet being substantially perpendicular to the vessel, and an upright side of said frame being adapted to rest  
100 against the vessel.

6. An apparatus for raising a sunken vessel, comprising a supporting member adapted to be lowered in position adjacent the  
105 sunken vessel, means for positioning said member against the vessel when lowered, and suckers or suction cups secured to the member and adapted to be attached to the vessel when the member is in position.

7. An apparatus for raising a sunken vessel, comprising a supporting member adapted to be lowered into position adjacent the  
110 sunken vessel, means for positioning said member against the vessel when lowered and suckers or suction cups secured to said member, the mouth of each sucker being provided with a covering adapted to be broken  
115 upon contact with the vessel.

8. An apparatus for raising a sunken vessel, comprising a plurality of cables adapted  
120 to be lowered in position around the sunken vessel, and means for positioning the cables around and adjacent to the vessel comprising a plurality of magnets carried by said cables, means for energizing the magnets  
125 when in their lowered position, and means for tightening the cables around the vessel.

9. An apparatus for raising a sunken vessel, comprising a plurality of cables adapted to be lowered in position around the sunken  
130



vessel, a plurality of frames connecting the cables, a plurality of magnets carried by the frames, and means for energizing the magnets.

5 10. An apparatus for raising a sunken vessel, comprising a cable adapted to be lowered in position around the vessel, means for tightening the cable when in position around the vessel, and means for clamping  
10 the cable when tightened, said last-mentioned means comprising a clamp and an electrical motor carried by said clamp adapted to operate to close the clamp on the cable.

15 11. An apparatus for raising a sunken vessel comprising a chain or cable adapted to be lowered around the vessel, an electrical magnet secured to the chain or cable, means for energizing the magnet to cause it  
20 to attach itself to the side of the vessel, means for exerting a lifting pull on the chain or cable and magnet and means for causing the pull of the magnet to be in a line substantially perpendicular to the side  
25 of the vessel to which the magnet is attached, said last mentioned means compris-

ing a supporting member upon which the magnet is mounted, adapted to rest against the side of the vessel.

12. An apparatus for raising a sunken vessel, comprising a sucker adapted to be lowered adjacent the side of the vessel, and means for securing the sucker in position against the vessel, said means comprising a magnet adapted to be lowered with the  
35 sucker.

13. An apparatus for raising a sunken vessel, comprising a sucker adapted to be lowered adjacent the side of the vessel, means for securing the sucker in position  
40 against the vessel, said means comprising a magnet adapted to be lowered with the sucker, and means adapted to operate to cause the sucker to adhere to the vessel  
45 when in position against the same.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

BAINBRIDGE PERCY CLARK.

Witnesses:

CLARK FOSDICK,  
FRANK PRESTON.