



A.D. 1877, 4th SEPTEMBER. N° 3359.

### Propelling Vessels.

LETTERS PATENT to Herbert John Haddan, of the Firm of Herbert and Company, Patent Agents, of 67, Strand, in the City of Westminster, Civil Engineer, for the Invention of "IMPROVEMENTS IN MACHINERY FOR PROPELLING AND GUIDING VESSELS ON LAND, AND THROUGH AIR AND WATER." A communication from abroad by Louis Brennan, of Fitzroy, in the Colony of Victoria, Engineer, and William Calvert, of Melbourne, in the said Colony, Printer.

Sealed the 1st February 1878, and dated the 4th September 1877.

PROVISIONAL SPECIFICATION left by the said Herbert John Haddan at the Office of the Commissioners of Patents on the 4th September 1877.

HERBERT JOHN HADDAN, of the Firm of Herbert and Company, Patent Agents, of 67, Strand, in the City of Westminster, Civil Engineer. "IMPROVEMENTS IN MACHINERY FOR PROPELLING AND GUIDING VESSELS ON LAND, AND THROUGH AIR AND WATER." A communication from abroad by Louis Brennan, of Fitzroy, in the Colony of Victoria, Engineer, and William Calvert, of Melbourne, in the said Colony, Printer.

This Invention consists of certain improvements in machinery for propelling and guiding vessels on land, and through air and water, principally applicable to torpedoes.

In the case of a torpedo we make the outer case in any suitable form, of any suitable material, and in any convenient part of the interior we place the mechanism for imparting motion to the propeller.

This mechanism consist essentially of a spindle, reel, pulley, or cylinder, upon which we wind a given amount of rope, wire, cord, or other hauling material. By the unwinding of this hauling material, a certain motion is imparted to said spindle, reel, pulley, or drum, determined by the speed at which the unwinding proceeds. This motion we utilize by transmitting it through any convenient contrivance to the spindle of the propeller.

The machinery for unwinding must be worked from a stationary or nearly stationary position, such as the deck of a vessel at anchor, or "lying to," or from the land. This machinery consists simply of a large reel, spindle, pulley, or drum.

[Price 6d.]

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*Haddan's Improvements in Machinery for Propelling Vessels.*

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We guide our torpedoes as follows:—The spindle of one of the drums on which the hauling material is wound is connected by bevel gearing with a solid shaft working inside a hollow shaft, which latter is connected to the spindle of the other drum. These spindles are connected together by bevel gearing for driving the propeller shaft. At a convenient point in said solid shaft we make a screw thread, 5 and at the same point in the hollow shaft we cut a slot quite through it, so as to admit of a grooved collar fitting on to said screw.

In the groove on said collar there is a forked clutch, which is connected by levers to the rudder, and the operation is this, that if the hauling material on either drum be removed at a greater velocity than the other it imparts a certain motion to said 10 grooved collar, and through it to the rudder.

This principle of varying the speed at which the wires are unwound from the reels, etc., in torpedoes may be applied in other than the precise way herein described, the principle being the unwinding of the hauling material from the several drums at 15 different velocities.

We provide valves for admitting water to the interior as the missile proceeds through the water, so that the weight which it loses by the unwinding of the wire may be counterbalanced by an inflow of water in order that it may keep submerged to a like extent from the time it commences until it finishes its voyage.

Instead of the hauling material being wound upon the reels, etc., in the torpedo 20 it may be arranged behind them in coils like the ropes of a ship or a submarine telegraph cable, and operate said reels as it passes over them to the unwinding apparatus.

By the unwinding of the hauling material in a similar way to that above described vessels may be propelled along the surface of the earth, or into the air. 25

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SPECIFICATION in pursuance of the conditions of the Letters Patent filed by the said Herbert John Haddan in the Great Seal Patent Office on the 1st March 1878.

HERBERT JOHN HADDAN, of the Firm of Herbert and Company, Patent Agents, 5 of 67, Strand, in the City of Westminster, Civil Engineer. "IMPROVEMENTS IN MACHINERY FOR PROPELLING AND GUIDING VESSELS ON LAND, AND THROUGH AIR AND WATER." A communication from abroad by Louis Brennan, of Fitzroy, in the Colony of Victoria, Engineer, and William Calvert, of Melbourne, in the said Colony, Printer.

10 This Invention consists of certain improvements in machinery for propelling and guiding vessels through water, principally applicable to torpedos.

In the case of a torpedo the outer case is made in any suitable form, of any suitable material, and in any convenient part of the interior I place the mechanism for imparting motion to the propeller.

15 This mechanism consists essentially of a spindle, reel, pulley, or cylinder, upon which I wind a given amount of rope, wire, or cord, or other hauling material. By the unwinding of this hauling material a certain motion is imparted to said spindle, reel, pulley, or drum, determined by the speed at which the unwinding proceeds. This motion is utilised by transmitting it through any convenient contrivance to 20 the spindle of the propeller.

The machinery for unwinding must be from a stationary or nearly stationary position, such as the deck of a vessel at anchor, or "lying to," or from the land. This machinery consists simply of a large revolving reel, spindle, pulley, or drum, such as that of a crab winch, on which a large barrel is placed.

25 In order to obtain a controlling power over the course which the torpedo is to travel, I provide two spindles, reels, pulleys, or drums, each carrying an independent wire or other hauling material, and each such wire having an independent revolving stationary reel, spindle, pulley, or drum. By varying the velocities at which these stationary reels, etc., revolve, a certain motion is imparted to the rudder one way or 30 the other, as may be required.

The spindle of one of the drums in the torpedo on which the hauling material is wound is connected by bevel gearing with a solid shaft working inside a hollow shaft, which latter is connected to the spindle of the other drum. These shafts are connected together by bevel gearing for driving the propeller shaft. From these 35 shafts is obtained the differential motion required for guiding the torpedo; thus, at a convenient point on said solid shaft a screw thread is made, and at the same point in the hollow shaft is cut a slot quite through it, so as to admit of a collar grooved on the outside, and having a projecting screw thread on the inside, which fits on to said screw.

40 In the groove on said collar there gears a catch at the end of a radiating lever hinged to the side of the vessel, which works the rudder through certain intermediate connections, and the operation is this, that if the hauling material on either drum be unwound at a greater velocity than the other it imparts a certain motion to said grooved collar, and through it and the other intermediate connections to the 45 rudder.

This principle of varying the speed at which the wires are unwound from the reels, etc., in the torpedoes may be applied in other than the precise way herein described, the principle being the unwinding of the hauling material from the several 50 drums at different velocities.

Instead of the hauling material being wound upon the reels, etc., in the torpedo, it may be arranged behind them in coils like the ropes of a ship or submarine telegraph cable, and operate said reels as it passes over them to the unwinding apparatus,

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Referring to the Drawings hereunto annexed, where the nature of the several Figures is distinctly marked, A and B are the drums on which the wires A<sup>1</sup> and B<sup>1</sup> or other hauling material is wound. This wire passes between the lips A<sup>2</sup>, the construction of which is clearly shown in detail sketch at the lower right-hand corner of the sheet, and also through guides A<sup>3</sup>, A<sup>3</sup>, at the stern, so as to prevent said 5 wire from fouling either the rudder or the propeller. Said drums are attached to mitre wheels A<sup>5</sup>, B<sup>5</sup>, respectively, which run loosely on their respective shafts A<sup>4</sup> and B<sup>4</sup>. Said mitre wheel A<sup>5</sup> gears into and drives another mitre wheel A<sup>6</sup>, fitted near the end of solid shaft A<sup>7</sup>. This solid shaft has a screw thread cut on its periphery at A<sup>8</sup>, and carries another mitre wheel A<sup>9</sup>, and a casting consisting of 10 boss and spindles A<sup>10</sup> and A<sup>11</sup>, carrying mitre wheels A<sup>18</sup> and A<sup>19</sup>. This solid shaft is connected at A<sup>12</sup> to the propeller shaft A<sup>13</sup> by stem of fork A<sup>14</sup>. A<sup>15</sup> are collars fitting in recesses in the thrust bearing A<sup>16</sup>; A<sup>17</sup> is the propeller; B<sup>4</sup> carries a mitre wheel B<sup>5</sup>, which gears into and drives another mitre wheel B<sup>6</sup>, forming the end of hollow shaft B<sup>7</sup>. This hollow shaft has two slots cut in it, one opposite the other, 15 and both in opposition to the screw thread A<sup>8</sup>, which slots are covered by a nut or collar B<sup>8</sup>, made in two halves, and having a projecting screw thread cut on its inner face, as shown in detail sketch between the plan and the horizontal section, one being a face view and the other a side view of said collar. Said hollow shaft terminates in a mitre wheel B<sup>9</sup>, which gears into wheels A<sup>18</sup> and A<sup>19</sup>. The groove on the outer 20 periphery of nut or collar B<sup>8</sup> receives a stud C on the end of lever arm C<sup>1</sup>, hinged to the side of the vessel at C<sup>2</sup>. This lever arm carries a pin C<sup>3</sup>, which works in a slot in lever arm C<sup>4</sup>, connected to the top of vertical spindle C<sup>5</sup>, at the bottom of which is a cross piece C<sup>6</sup>. Each end of this cross piece is connected to opposite sides of the rudder C<sup>7</sup> by means of wires C<sup>8</sup> passing through tubes C<sup>9</sup>. D, D, are fins consisting 25 of strong metal plate, each fin supported by a spindle, the outer end of which is carried in bent arm D<sup>1</sup>, and the inner end turned, tapered, and ground to fit a conical seat in the casting D<sup>2</sup>. The inner end of these spindles is squared to fit into square holes in the rocking piece D<sup>3</sup>; D<sup>4</sup>, D<sup>4</sup>, are wire rods connecting said rocking piece to cross piece D<sup>5</sup>, operated by levers D<sup>6</sup>, which is attached to vertical spindle 30 D<sup>7</sup>; D<sup>8</sup> is a coiled spring, and D<sup>9</sup> is a leather contrivance like a dry meter, exposed to the pressure of the water outside through hole D<sup>10</sup>. E is a mast, consisting of a steel blade carrying a disc or flag to indicate its position. This blade, carrying a disc, is supported on a horizontal pin E<sup>1</sup> projecting from the side of the torpedo, which pin is held by one end of a coiled spring E<sup>2</sup>, the other end being fastened to 35 the containing box E<sup>3</sup>. This spring is to allow the mast to give to the pressure of any obstruction, and to compel it to return to its upright position as soon as such obstruction is passed. H is a lid, which is screwed down with suitable water-tight packing.

Referring to the Drawings which represent the apparatus for unwinding the 40 hauling material from the drums in the torpedo, and in which the nature of the several Figures is distinctly marked. A<sup>20</sup> is the drum on which the wire from drum A on the torpedo is wound, and B<sup>10</sup> the drum on which the wire from drum B is wound. These drums A<sup>20</sup> and B<sup>10</sup> run loosely on the driving shaft F. A<sup>21</sup> is a bevel wheel, and A<sup>22</sup> a mitre wheel, both being cast with the drum A<sup>20</sup>. A<sup>21</sup> gears 45 into a bevel pinion A<sup>23</sup> cast on the end of a hollow spindle A<sup>24</sup>, at the opposite end of which is mitre wheel A<sup>25</sup> gearing into two mitre wheels A<sup>26</sup> and A<sup>27</sup>, carried on spindle A<sup>28</sup>. A<sup>22</sup> gears into and receives its motion from two mitre wheels A<sup>29</sup> and A<sup>30</sup>, carried on cross spindle A<sup>31</sup>, keyed on driving shaft F. F<sup>1</sup> is driving pulley; A<sup>32</sup> is a metal shield; B<sup>11</sup> is a bevel wheel, and B<sup>12</sup> is a mitre wheel, both cast with 50 the drum B<sup>10</sup>; B<sup>11</sup> gears into bevel wheel B<sup>13</sup>, keyed to end of solid spindle B<sup>14</sup>, which passes loosely through hollow spindle A<sup>24</sup>. At the end of this solid spindle is keyed another mitre wheel B<sup>15</sup>, which also gears into mitre wheels A<sup>26</sup> and A<sup>27</sup>.

The method of operation is as follows:—First, so far as regards<sup>o</sup> the propulsion 55 only. On each of the drums A and B a quantity of wire is wound, four times the

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length of the distance to which the torpedo is to be propelled; thus, if it is contemplated to propel it a quarter of a mile, a mile of wire is wound on each drum.

I have found charcoal iron wire a thirty-second part of an inch in diameter sufficient to propel a torpedo nine feet long, weighing about three hundredweight, for a distance of 300 yards at a speed of about six or seven miles an hour, but steel wire of a smaller size is preferable, the relative strengths of the several kinds of wire being well understood in the trade.

The wires are passed between the lips A<sup>2</sup>, and through the guides A<sup>3</sup> and B<sup>3</sup>, and fasten the ends to the respective stationary drums. The torpedo is launched, and the engine started which is to work the unwinding reels or drums A<sup>20</sup> and B<sup>10</sup>, as near simultaneously as possible, with this result, that the vessel is propelled by the revolution of the propeller produced by the motion of the drums A and B.

If the torpedo requires to travel more to the right it can be compelled to do so by increasing the velocity of the drum B<sup>10</sup>, which is unwinding the wire from the drum B, or decreasing the velocity of the other, or by increasing one end and decreasing the other at one and the same time. This increase in the velocity of the drum B<sup>10</sup> is accomplished by turning the handle on spindle A<sup>28</sup> in the same direction as the hands of a watch, that is to say, towards the right hand.

If the screw thread A<sup>8</sup> and its embracing nut B<sup>8</sup> be made of an opposite pitch to that shewn in the Drawings it would be necessary to reverse the directions as to guiding the vessel.

The way in which the guiding is effected is thus:—When the increased velocity is given to the drum B it imparts a quicker motion to the hollow shaft B<sup>7</sup> than that which is given to the solid shaft A<sup>7</sup>, the result of which is that the nut or collar B<sup>8</sup> travels on the screw thread A<sup>8</sup> towards the drum B. As it travels it carries with it the stud C (which catches in the groove in its outer periphery) and so operates the hinged lever arm C<sup>1</sup>, which in its turn moves the radiating lever arm C<sup>4</sup> by means of pin C<sup>3</sup>, and so moves the cross piece C<sup>6</sup> at the bottom of the vertical spindle C<sup>5</sup>. This cross piece in its turn moves the rudder through connecting wires C<sup>8</sup>.

In order to give either an upward or downward direction to the torpedo, as may be required, I raise or depress the nose of the fins D, D, by means of the leather contrivance D<sup>9</sup>, which is pressed upwards whenever the pressure of the water is greater than that of the coiled spring D<sup>8</sup>, that is to say, whenever the vessel sinks too deep the contrivance D<sup>9</sup> is pressed upward, with this result, that it depresses the nose of the fins D, D, through the intermediate gearing shewn in longitudinal and horizontal sections, and causes the bow of the torpedo to rise and travel upwards until the equilibrium between the pressure of the water and that of the coiled spring D<sup>8</sup> is restored. An opposite effect is necessarily produced if the torpedo rises too high. This contrivance of fins and the apparatus for working them is not new.

Disclaiming from this my Specification the application of the said improvements in machinery for propelling and guiding vessels on land and through air, I claim,—

1st. The propulsion of vessels through water by the unwinding of wire or other hauling material from a drum or its equivalent fixed on the vessel to be propelled.

2nd. The guidance of vessels through water by the unwinding of such wire or hauling materials from said drums at varying velocities.

3rd. The peculiar mechanical arrangement for carrying out these governing principles of propelling and guiding vessels through water, substantially as herein described, and illustrated in the Drawings.

4th. The combination and arrangement of mechanical parts illustrated for

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unwinding the hauling material from the drums in the torpedo at the same or at varying velocities, substantially as herein described and explained.

In witness whereof, I, the said Herbert John Haddan, have hereunto set my hand and seal, this Twenty-eighth day of February, in the year of our Lord 1878.

H. J. HADDAN. (L.S.)

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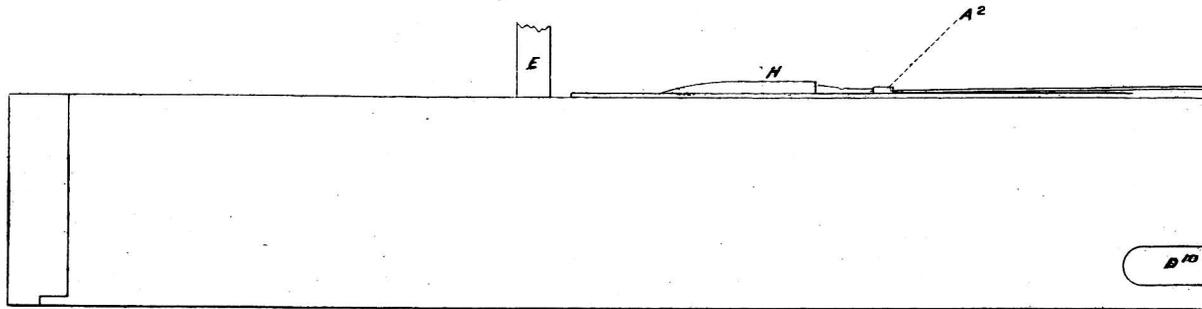
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Printers to the Queen's most Excellent Majesty.  
For Her Majesty's Stationery Office.

1878.

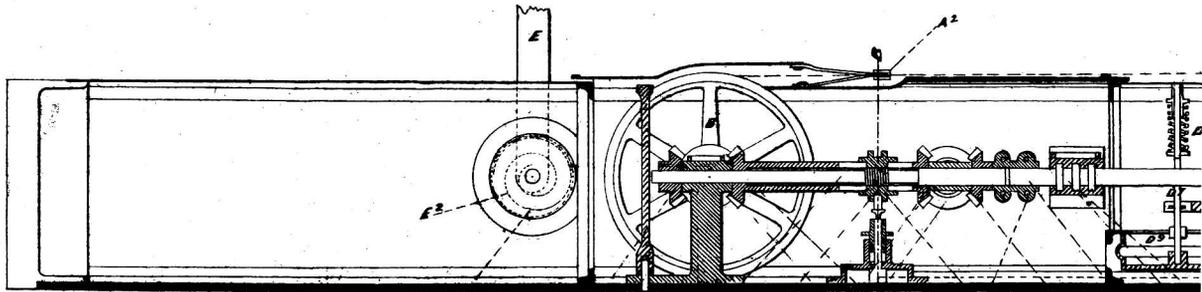
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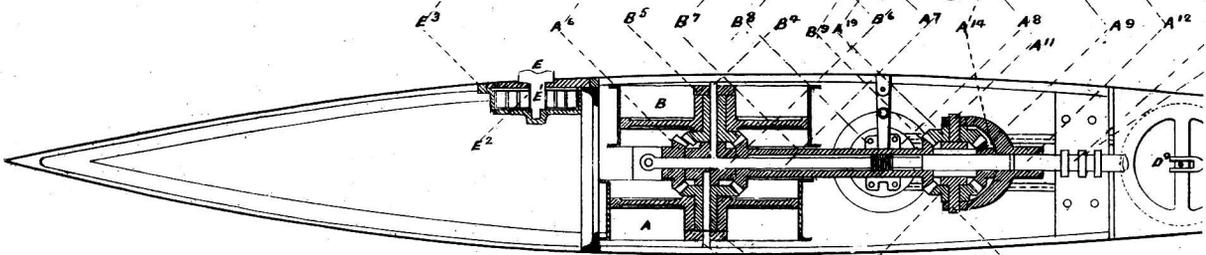
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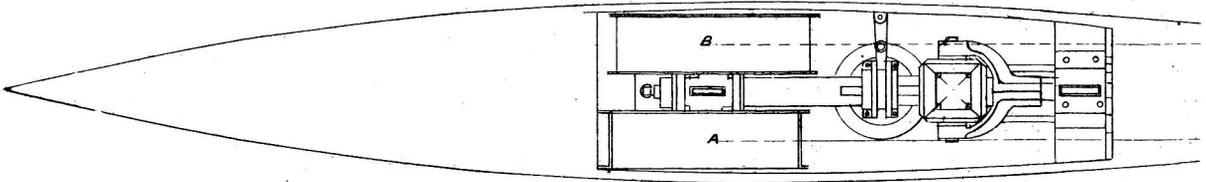
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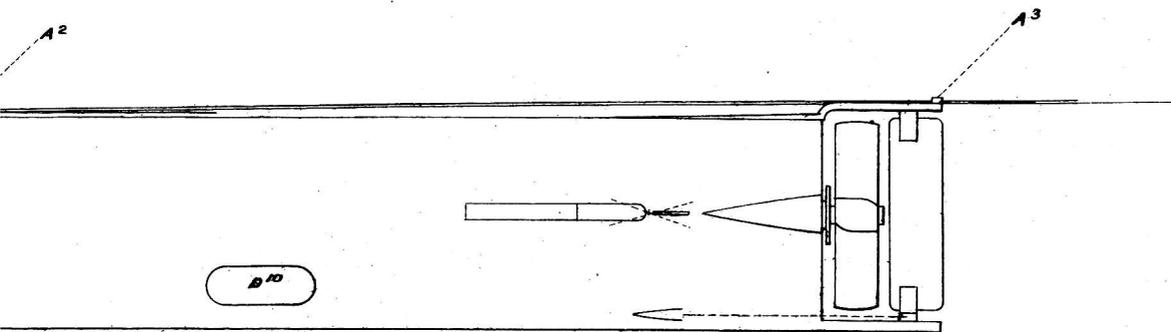


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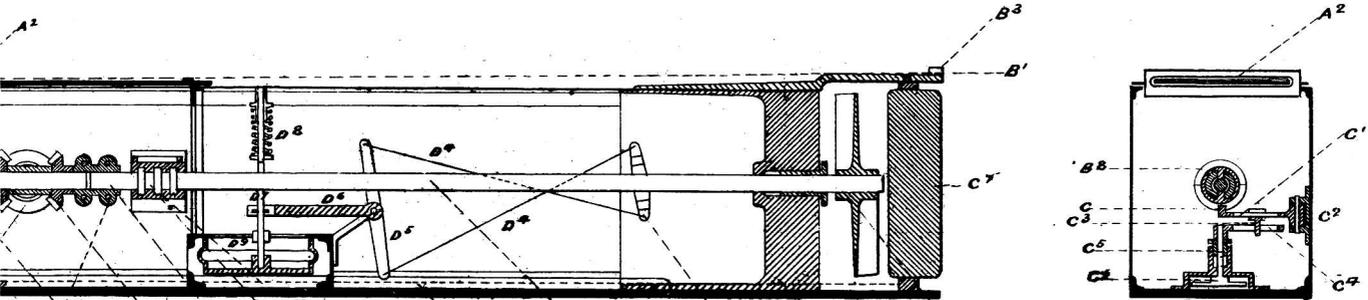


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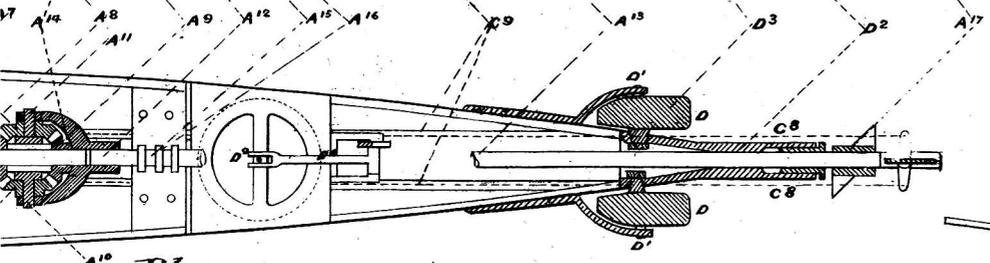
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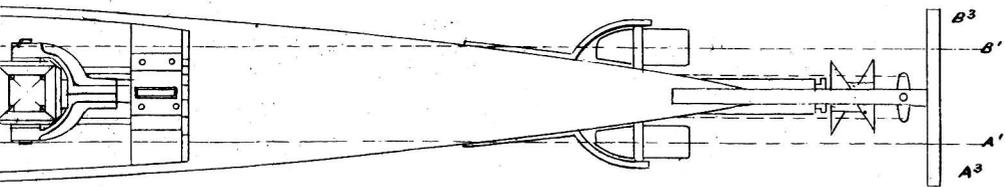
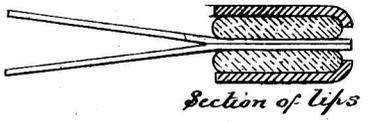
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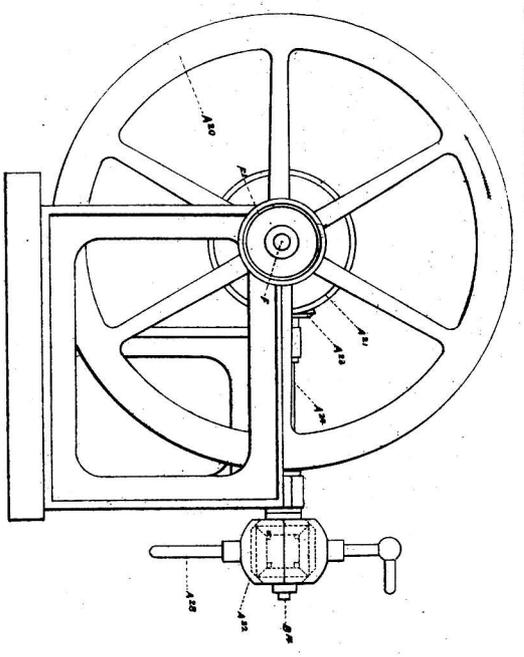
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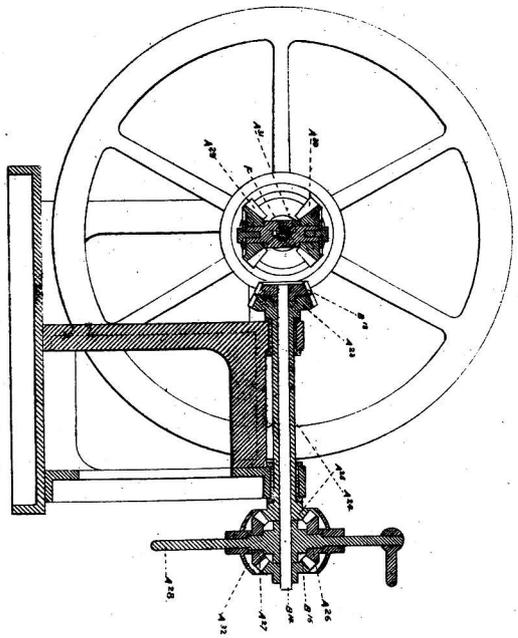
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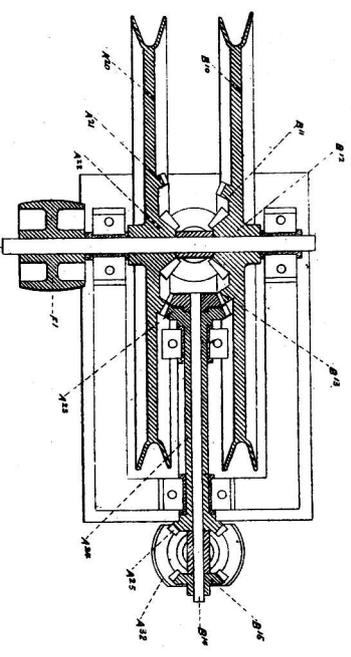
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*Side Elevation*



*Sectional Side Elevation*



*Sectional Plan*

*The filed drawing is not colored.*

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