

No. 635,384.

Patented Oct. 24, 1899.

I. LEHMAN.

COMBINED STEERING AND PROPELLING APPARATUS.

(Application filed Aug. 18, 1899.)

(No Model.)

FIG I-

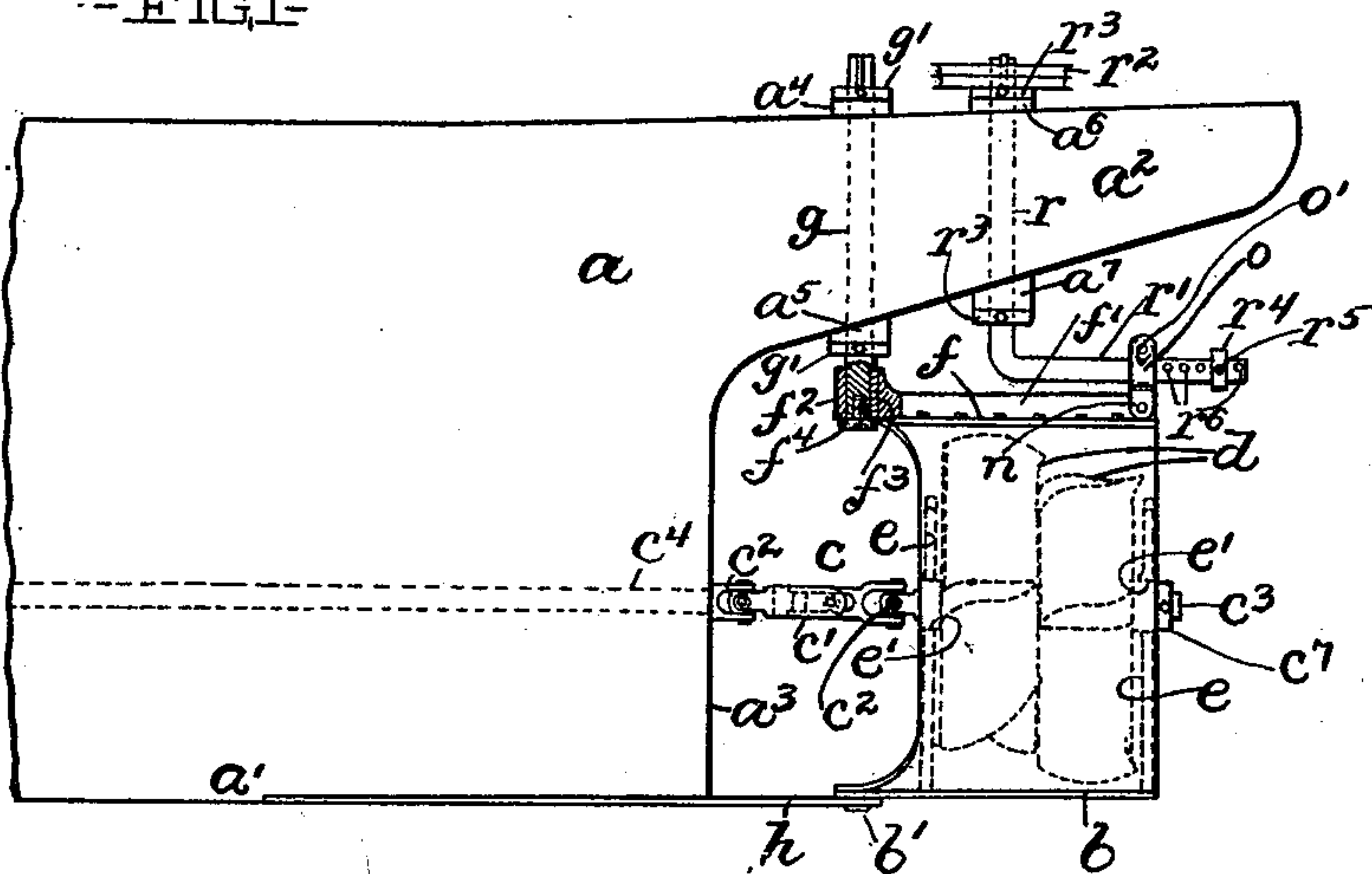


FIG II-

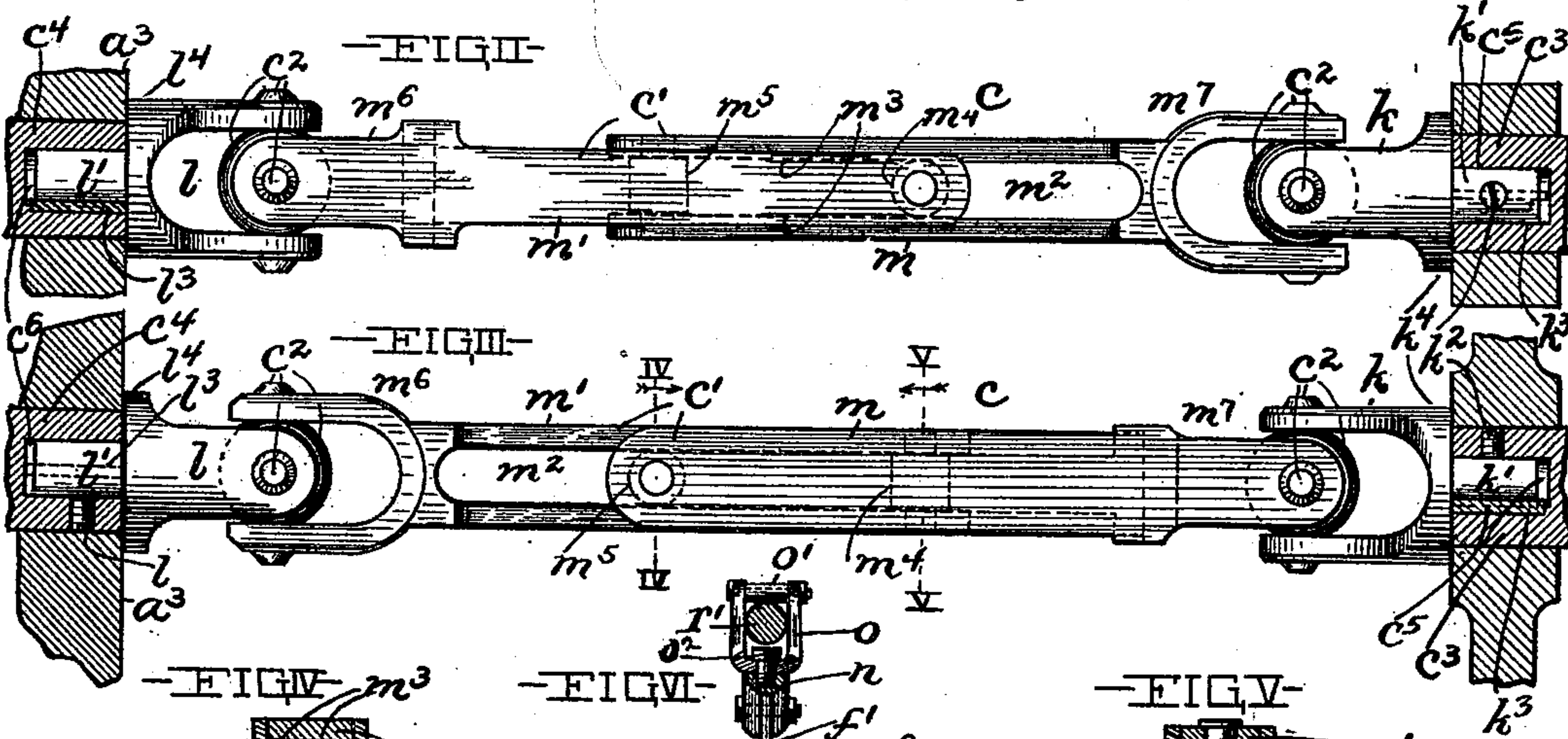


FIG III-

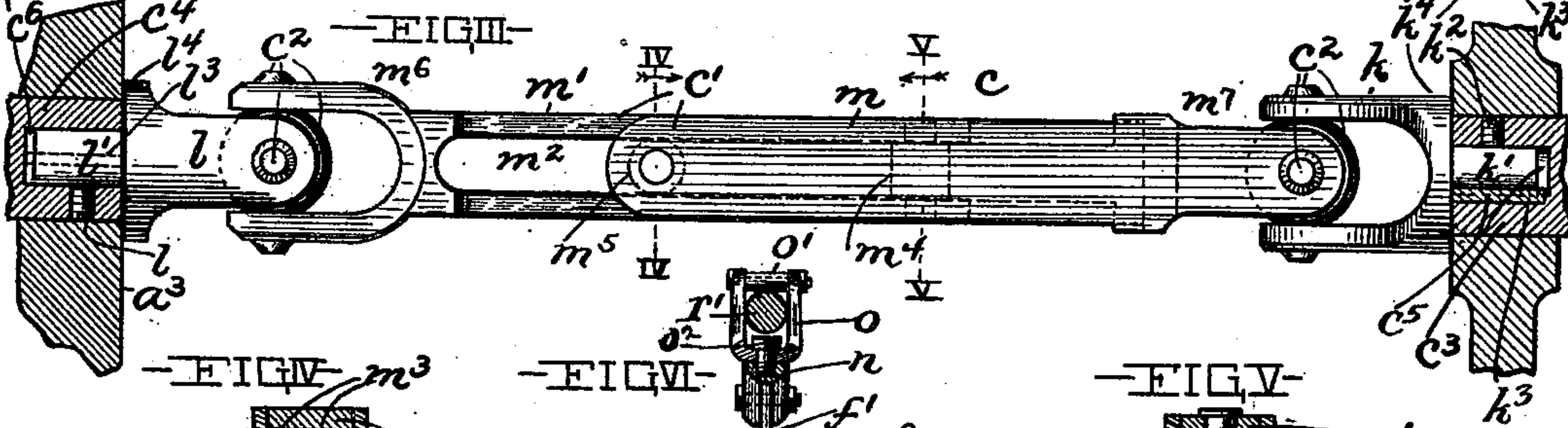


FIG IV-

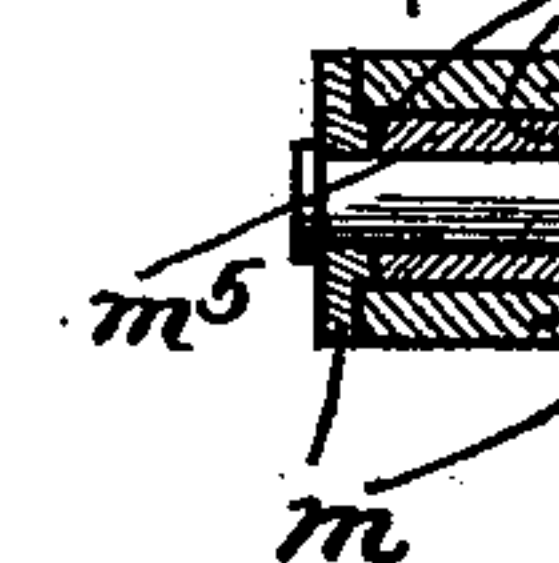


FIG V-

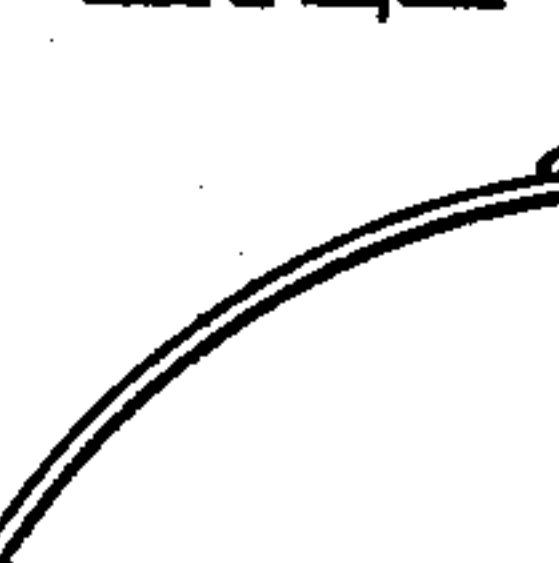
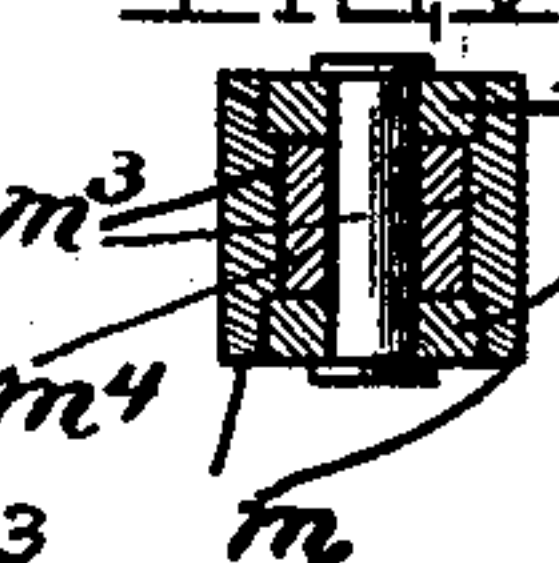


FIG VI-



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UNITED STATES PATENT OFFICE.

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COMBINED STEERING AND PROPELLING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 635,384, dated October 24, 1899.

Application filed August 18, 1899. Serial No. 727,617. (No model.)

To all whom it may concern:

Be it known that I, ISADOR LEHMAN, a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Combined Steering and Propelling Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in combined propelling and steering apparatus for boats or vessels, and it pertains more especially to apparatus of the character indicated that comprises a cylindrical open-ended rudder-forming casing containing the wheel or wheels of the propeller.

One object of the present invention is to provide mechanism for oscillating or swinging the said rudder-forming casing in a horizontal plane with facility.

Another object of the invention is to provide an improved construction of jointed propeller-shaft, so as to accommodate the location of the propelling and steering apparatus in the closest practical proximity to the rear end of the stern-post of the boat or vessel, to accommodate the movement of the rudder-forming casing without interfering with the operation of the propeller-shaft, and to afford a large sweep for the casing without interfering with the operation of the propeller-shaft and without causing undue friction in the joints of the shaft.

With these objects in view and to the end of attaining certain other advantages hereinafter appearing the invention consists in certain features of construction and combinations of parts hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure I is a side elevation, partly in section, of the rear end of a boat or vessel provided with my improved combined propelling and steering apparatus. Fig. II is a top plan of that portion of a propeller-shaft that lies between the wheel or wheels of the propeller and the stern-post or stern of the boat or vessel, in this figure portions of the stern and the rudder-forming casing being shown in section. Fig. III is a side elevation of the parts shown in Fig. II. Figs. IV and V are sections, respectively, in detail,

on lines IV IV and V V, respectively, Fig. III. Fig. VI is a rear end elevation of the casing *b* and shows the connection between the said casing and the operating-shaft *r* partly in section.

Referring to the drawings, *a* designates the stern end of a boat, and *a'* the vessel's keel. *b* represents the central open-ended rudder-forming casing, that is arranged in a horizontal plane below the stern's overhang *a*².

c designates the propeller-shaft, that extends into the stern at the stern-post *a*³ below the stern's overhang and horizontally and longitudinally through and centrally of the casing *b*, and the propeller wheel or wheels *d* are operatively mounted upon the said shaft within the casing *b* in any approved manner. The casing *b* affords a support for the rear end of the propeller-shaft, and the said support comprises, preferably, two armed spiders *e e*, arranged within opposite ends, respectively, of the casing *b* and secured to the latter in any approved manner. Each of the spiders *e*, as shown in Fig. VI, has a hub *e'*, that embraces and affords bearing for the propeller-shaft, and three arms *e*², that are integral with and arranged radially and at equal intervals circumferentially of the hub and extend from the hub to the casing to which they are secured, preferably, by screws *e*³. The said spiders brace the cylinder internally. A T-beam *f* is secured to and externally of the top of the casing *b* and is arranged centrally and longitudinally of the casing's top. The beam *f* is arranged, furthermore, with its central flange *f'* projecting upwardly. The beam *f* extends, preferably, from end to end of the casing *b* and is provided at its inner end with a vertically-arranged eye or boss *f*², that is engaged internally by the lower end of an upright shaft *g*, that extends vertically through the stern's overhang and a suitable distance above the latter. The casing *b* at the bottom and inner end is pivoted vertically, as at *b'*, to a bar *h*, that projects rearwardly from the keel and is secured to the latter in any approved manner. The axes of the shaft *g* and the pivot *b'* are coincident. The pivot *b'* constitutes the lower pivotal center of the rudder-forming casing, and the shaft *g* forms the upper pivotal center of the said rudder.

To accommodate the movement of the rear end of the propeller-shaft with the casing b when the latter is swung in a horizontal plane in the one direction or the other as required in steering the boat or vessel, the propeller-shaft comprises an extensible section c' , arranged between the rudder and the stern-post and secured to the adjacent or contiguous sections of the shaft by universal joints c^2 . The most rearward section c^3 of the propeller-shaft—that is, the shaft-section next rearward of the extensible section c' —extends through the casing b and bears the propeller wheel or wheels. The shaft-section c^4 , that is next forward of the extensible section, enters the stern at the stern-post.

The shaft-section c^3 has its inner end terminating in a fork k , that participates in the formation of the support for the universal joint between the said shaft-section and the extensible shaft-section, which fork has its shank k' engaging a bore c^5 , formed in the inner end of the shaft-section c^3 and secured to the latter by a set-screw k^2 and the well-known means of groove and feather k^3 . The fork k at the inner end of its shank has an annular shoulder k^4 , that abuts against the outer side of the forward spider e , that consequently forms a thrust-bearing for the shaft, which bearing is properly arranged for receiving any rearward thrust upon the shaft.

The shaft-section c^4 has its outer end terminating in a fork l , that participates in the formation of the support for the universal joint between the said shaft-section and the extensible shaft-section, which fork has its shank l' engaging a bore c^6 , formed in the outer end of the shaft-section c^4 and secured to the latter by a set-screw l^2 and the well-known means of groove and feather l^3 . The fork l at the inner end of its shank has an annular shoulder l^4 , that abuts against the outer side of the stern-post or stern.

The extensible section c' of the shaft consists, preferably, of two parts m and m' , arranged to slide endwise of each other. Each of the said parts is slotted longitudinally, as at m^2 . One of the said parts (part m in the case illustrated) has the side walls of its slot m^2 overlapping the longitudinal edges of the side walls of the other part m' and enlarged inwardly, as at m^3 , so as to snugly but slidably fit between the side walls of the part m' . By this construction the said parts are operatively connected together so far as rotating in unison is concerned, and each of the parts is prevented from turning independently of the other part during the operation of the propeller-shaft. To reduce the friction between the said parts, two antifriction-rollers m^4 and m^5 are provided. Roller m^5 is arranged within and transversely of the slot m^2 of the part m and braces apart the side walls of the slot m^2 of the part m' . Roller m^4 is arranged within and transversely of the slot m^2 of the part m' and braces apart the side walls of the slot in the part m . The part m at the

joint formed between it and the stern-entering shaft-section terminates in a fork m^6 , that participates in the formation of the support for the said joint and is arranged at right angles to the fork of the stern-entering shaft-section. The part m' at the joint formed between it and the propeller-wheel-bearing shaft-section terminates in a fork m^7 , that participates in the formation of the support for the said joint and is arranged at right angles to the fork of the wheel-bearing shaft-section.

The construction involving the peculiarities of the arrangement and assemblage of the parts of the extensible shaft-section and the connection of the said shaft-section with the remaining shaft-sections is not only meritorious on account of its durability and simplicity, but because it accommodates the location of the rudder-forming casing in the closest practical proximity to the stern of the boat or vessel.

Obviously the extensible shaft-section c' and the connection of the said section by universal joints with the stern-entering and propeller-wheel-bearing shaft-sections are essential to accommodate the oscillation or swinging of the rudder-forming casing in a horizontal plane, and an important feature of the present invention consists in the location of the joint between the wheel-bearing section c^3 and the next forward and extensible section rearwardly of the axial line of the casing b , or, in other words, the pivotal centers of the casing b are located a considerable distance forward of the center of the joint between the extensible shaft-section c' and the wheel-bearing shaft-section c^3 , because by this construction the shaft-section c^3 will during the oscillation or swinging of the casing b in a horizontal plane swing not only upon the joint between the said shaft-section and shaft's extensible section, but both of the said shaft-sections will swing together upon the joint between the extensible shaft-section and the stern-entering shaft-section, and consequently the casing b can be swung laterally to a greater angle than would be the case if the center of the joint between the extensible shaft-section and the pivotal centers of the casing were in line vertically. The construction hereinbefore described not only affords the rudder-forming casing b a greater sweep, but prevents the wear upon the joints of the flexible shaft from coming upon one of the joints only.

An inverted-U-shaped plate or block n straddles and is secured to the upright flange of the beam f at the latter's rear end. A U-shaped block or plate o has its central member pivoted vertically, as at o^2 , or swiveled to the upper end of the block or plate n and has its upright end members arranged at opposite sides, respectively, of the laterally-projecting arm r' of the operating-shaft r , that is arranged vertically and extends upwardly through the stern's overhang, prefer-

ably about midway between the outer end of the casing b and the axial line of the said casing. The operating-shaft is provided at its upper end with a wheel or device r^2 for actuating the same. The shaft-arm r' is formed upon the lower end of the shaft and engages the under side of an antifriction-roller o' , suitably supported from the U-shaped piece o . The casing b is provided, therefore, with a device that is swiveled to the top of the rear end of the casing and embraces the shaft-arm r' . Obviously the said shaft is instrumental in supporting the rear end of the casing b , and the provision of the shaft-arm r' and the latter's connection with the casing's outer end afford a greater leverage than would be obtained by the connection of the said shaft to the casing nearer the latter's inner end.

The shaft g , that, as already indicated, forms the upper pivotal center of the casing b , may be used as the operating-shaft in case the actual operating-shaft r or the connection between the latter and the casing b becomes disabled, and the extension of the shaft g upwardly through the stern's overhang is to accommodate the application to the said shaft of a wheel or other device for turning the same. The shaft g to enable its use as the operating-shaft is operatively connected with the boss or eye f^2 , and consequently with the casing b , by the well-known means of groove and feather f^3 . A screw f^4 engages a correspondingly-threaded hole formed in the lower end of the shaft g and has its head overlapping and abutting against the lower end of the eye or boss f^2 , and consequently the casing b at the latter's top and inner end is supported from the shaft g .

Two boxes a^4 and a^5 , arranged at the top and bottom, respectively, of and rigid with the stern's overhang, afford bearing for the shaft g , and collars g' , fixed or formed upon the said shaft at the outer ends of the said boxes, in connection with the boxes, prevent vertical displacement of the shaft.

Two boxes a^6 and a^7 , arranged at the top and bottom, respectively, of and rigid with the stern's overhang, afford bearing for the shaft r , and collars r^3 , fixed or formed upon the said shaft at the outer ends of the boxes, in connection with the boxes, prevent vertical displacement of the shaft.

A collar c^7 , fixed or formed upon the propeller-shaft at the outer end of the casing b at the outer side of the rear casing-bracing spider e , forms a thrust-bearing for any forward thrust upon the propeller-shaft.

A stop for preventing the casing b from being swung too far in either direction is provided, and consists, preferably, of a collar r^4 , that is adjustably mounted upon the shaft-arm r' by a pin r^5 engaging one of a series of holes r^6 , formed in and arranged at suitable intervals lengthwise of the arm. The collar is obviously capable of as many different adjustments as there are pin-receiving holes r^6 .

Obviously the propeller-wheels, that are confined between the spiders e and e , brace apart the spiders and, together with the spiders, constitute a thrust-bearing for the propeller-shaft. In fact, the interposition of the propeller wheel or wheels between the spiders e and the provisions of the shoulders or collars k^4 and c^7 at the outer ends of the hubs of the said spiders cause the entire thrust upon the propeller-shaft to be borne by the rudder-forming casing, and this result is exceedingly desirable in the apparatus illustrated. It should be observed also that the swiveled connection of the part o to the casing b , so as to accommodate the turning of the said part o during the swinging of the said casing laterally, is obviously necessary.

What I claim is—

1. In apparatus of the character indicated, the combination of the propeller wheel or wheels; the propeller-shaft having a section bearing the said wheel or wheels, another section entering the boat's stern, and an extensible section between the wheel-bearing section and the stern-entering section, and universal joints between the extensible section and the remaining aforesaid sections; a fork formed upon the inner end of the wheel-bearing section, which fork participates in the support of the universal joint between the said shaft-section and the extensible shaft-section; an open-ended casing surrounding the propeller wheel or wheels and supported as required to render it capable of being swung in a horizontal plane; spiders bracing the said casing internally and arranged at opposite ends, respectively, of the propeller-wheel-bearing portion of the wheel-bearing shaft-section; a shoulder formed upon the aforesaid fork at the outer end of the hub of the inner spider, and a collar fixed upon the wheel-bearing shaft-section at the outer end of the hub of the outer spider, substantially as and for the purpose set forth.

2. In apparatus of the character indicated, the combination of the propeller-wheel-bearing section c^3 having its inner end provided with the fork k ; the stern-entering shaft-section c^4 terminating, at its outer end, in the fork l ; the extensible shaft-section m arranged between the two aforesaid shaft-sections and having each end terminating in a fork arranged at right angles to the adjacent fork of the adjacent shaft-section; universal joints formed between adjacent forks; the propeller wheel or wheels carried by the wheel-bearing section of the shaft; an open-ended casing surrounding the wheel-bearing portion of the wheel-bearing shaft-section and having its inner end supported as required to render it capable of swinging in a horizontal plane, and means for swinging the said casing, substantially as set forth.

3. In apparatus of the character indicated, the combination of the propeller-wheel-bearing shaft-section c^3 having the bore c^5 ; the fork k having the shank k' and the shoul-

der k^4 ; an operative connection between the fork's shank and the surrounding wall of the aforesaid bore; the casing b suitably supported at its inner end to render it capable of swinging in a horizontal plane; the spiders e having the hubs e' and the radial arms e^2 ; the collar c^7 ; the stern-entering shaft-section c^4 having the bore c^6 and the fork l provided with the shank l' ; an operative connection between the last-mentioned shank and the surrounding wall of the last-mentioned bore, and an extensible section interposed between and connected to the aforesaid forks by universal joints, substantially as set forth.

4. In apparatus of the character indicated, the combination of the propeller-wheel-bearing shaft-section; an open-ended casing surrounding the wheel-bearing portion of the said shaft-section, and having its inner end supported as required to render it capable of being swung in a horizontal plane; means for swinging the said casing upon its axis; a stern-entering shaft-section; an extensible shaft-section interposed between the stern-entering shaft-section and the wheel-bearing shaft-section; universal joints between the extensible shaft-section and the remaining aforesaid shaft-sections, and the said extensible shaft-section comprising the following: the part m' slotted longitudinally, the part m slotted longitudinally and having the side walls of its slot overlapping the adjacent edges of the side walls of the first-mentioned part and enlarged inwardly between the said side walls of the first-mentioned part, and the rollers m^4 and m^5 , all arranged substantially as shown, for the purpose specified.

5. In apparatus of the character indicated, the combination with a boat or vessel: of the propeller-shaft having a stern-entering section, a propeller-wheel-bearing section, an extensible section interposed between the stern-entering section and the wheel-bearing section, and two universal joints between the wheel-bearing section and stern-entering section and opposite ends, respectively, of the extensible section; a casing surrounding the wheel-bearing portion of the wheel-bearing shaft-section and having its inner end supported from the boat or vessel in such a manner as to render the casing capable of being swung in a horizontal plane; means for swinging the casing, and the location of the joint between the extensible shaft-section and the wheel-bearing shaft-section being such, relative to the axial line of the casing, that, when the casing is in line with the boat or vessel, the joint between the wheel-bearing shaft-section and the extensible shaft-section shall be rearward of the casing's axial line, substantially as and for the purpose set forth.

6. In apparatus of the character indicated, the combination with a boat or vessel: of the propeller-shaft having a stern-entering section, a propeller-wheel-bearing section, an extensible section interposed between the

stern-entering section and the wheel-bearing section, and two universal joints between the wheel-bearing section and stern-entering section and opposite ends, respectively, of the extensible section; an open-ended casing surrounding the wheel-bearing portion of the wheel-bearing shaft-section, and pivotally supported, at its inner end, top and bottom, from the boat or vessel, with the two pivotal centers arranged in line vertically; means for swinging the casing upon the said pivotal centers, and the arrangement of parts being such that the joint between the wheel-bearing shaft-section and the extensible shaft-section shall, when the casing is in line with the boat or vessel, be located rearwardly of the casing's pivotal centers, substantially as and for the purpose set forth.

7. In apparatus of the character indicated, the combination with the stern of a boat or vessel: of the propeller-shaft having a stern-entering section, a propeller-wheel-bearing section, an extensible section interposed between the stern-entering section and the wheel-bearing section, and two universal joints between the wheel-bearing section and stern-entering section and opposite ends, respectively, of the extensible section; an open-ended casing surrounding the wheel-bearing portion of the wheel-bearing section of the shaft; a vertically-arranged eye or boss formed upon the top and inner end of the said casing; a vertically-arranged shaft supported from the stern's overhang and extending through the said eye or boss and provided with a member overlapping the lower end of the boss or eye; a bar rigid with the boat or vessel and arranged to support the aforesaid casing at the latter's bottom, and a vertically-arranged pivot securing the said casing to the casing's last-mentioned support, and the said pivot and the aforesaid vertically-arranged shaft being arranged in line vertically, substantially as and for the purpose set forth.

8. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is provided, at its lower end, with a laterally-projecting arm operatively connected with the aforesaid casing, and means for turning the shaft, substantially as and for the purpose set forth.

9. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is

provided, at the lower end, with a laterally-projecting arm operatively connected with the aforesaid casing; means for turning the shaft, and a stop for limiting the lateral swinging of the casing in either direction.

10. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is provided, at its lower end, with a laterally-projecting arm; means for turning the shaft; a device swiveled to the top of the casing and embracing the shaft-arm, substantially as and for the purpose set forth.

11. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is provided, at its lower end, with a laterally-projecting arm; means for turning the shaft; a device swiveled to the top of the casing and embracing the aforesaid shaft-arm, and a collar adjustably mounted upon the said arm at the outer side of the aforesaid arm-embracing device, substantially as and for the purpose set forth.

12. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is provided, at its lower end, with a laterally-projecting arm; means for turning the shaft, and a device swiveled to the top of the casing and embracing the aforesaid shaft-arm, and comprising an antifriction-roller resting upon the shaft-arm.

13. In apparatus of the character indicated, the combination with the stern of a boat or vessel, and the propeller-wheel-containing

casing having its inner end supported from the stern's overhang as required to render it capable of being swung in a horizontal plane; of an upright shaft arranged above and between the ends of the said casing, which shaft is supported from the stern's overhang and is provided, at its lower end, with a laterally-projecting arm; means for turning the shaft; a T-beam secured to the top and arranged longitudinally of the casing; an inverted-U-shaped plate or block straddling and secured to the outer end of the said beam; a U-shaped plate or block having its central member pivoted vertically, or swiveled, to the central member of the inverted-U-shaped member, and having its upright end members arranged at opposite sides, respectively, of the aforesaid shaft-arm, and an antifriction-roller supported from and arranged between the said end members and resting upon the said shaft-arm, substantially as shown, for the purpose specified.

14. In apparatus of the character indicated, the combination with the stern of a boat or vessel: of the propeller-shaft having a stern-entering section, a propeller-wheel-bearing section, an extensible section interposed between the stern-entering section and the wheel-bearing section, and two universal joints between the wheel-bearing section and stern-entering section and opposite ends, respectively, of the extensible section; an open-ended casing surrounding the wheel-bearing portion of the wheel-bearing section of the shaft; a vertically-arranged eye or boss formed upon the top and inner end of the said casing; a vertically-arranged shaft supported from the stern's overhang and extending through the said eye or boss, which shaft is operatively connected with the casing and provided with a member overlapping the lower end of the said boss or eye; an upright shaft supported from the stern's overhang, and arranged between the ends of the aforesaid casing; a laterally-extending arm formed upon the lower end of the said shaft and operatively connected with the outer end of the casing, substantially as set forth.

Signed by me, at Cleveland, Ohio, this 14th day of August, 1899.

ISADOR LEHMAN.

Witnesses:

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A. H. PARROTT.