

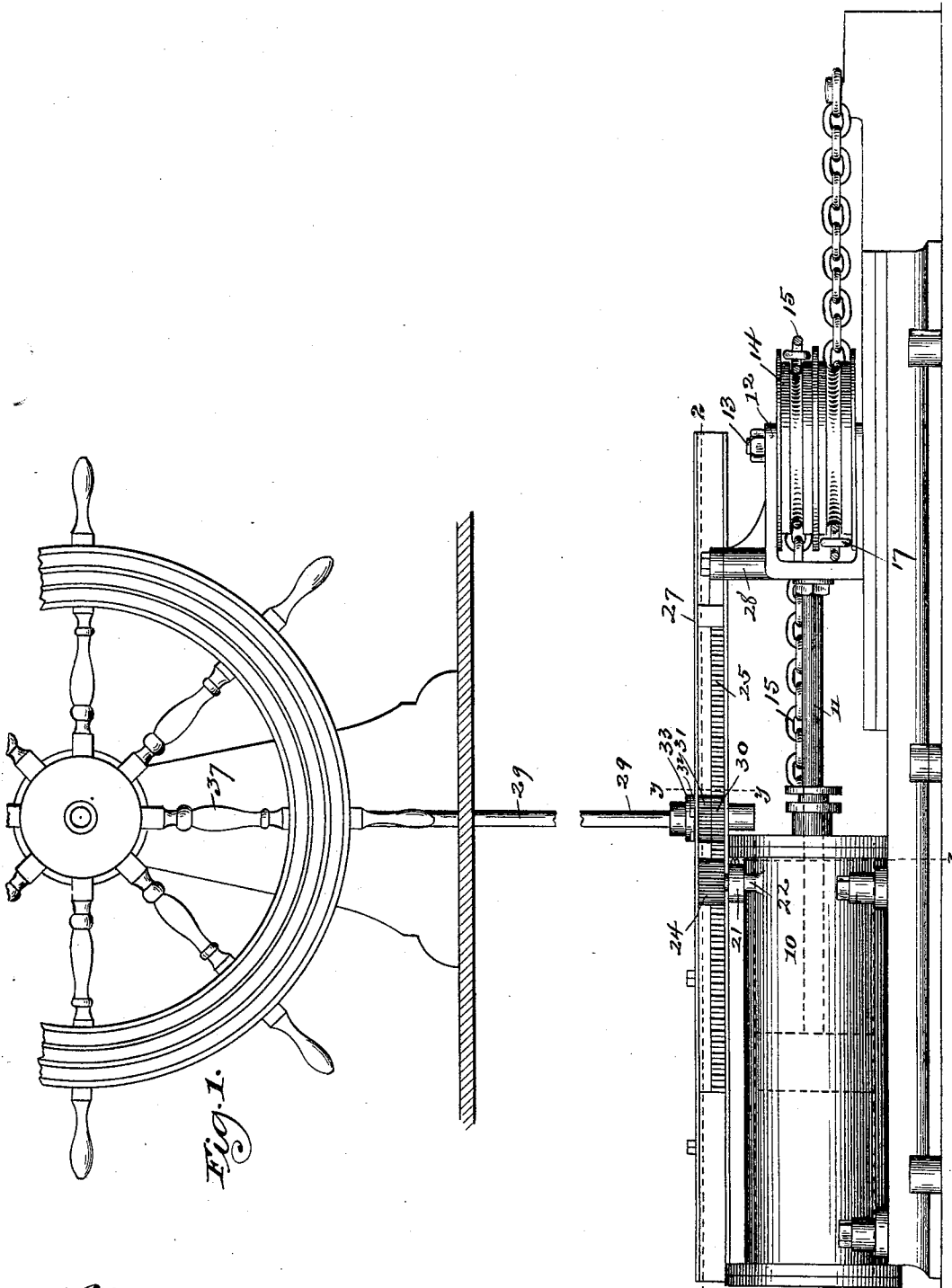
(No Model.)

3 Sheets—Sheet 1.

E. HEYDE.
STEAM STEERING APPARATUS.

No. 521,652.

Patented June 19, 1894.



Witnesses,
E. Mamm
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Inventor,
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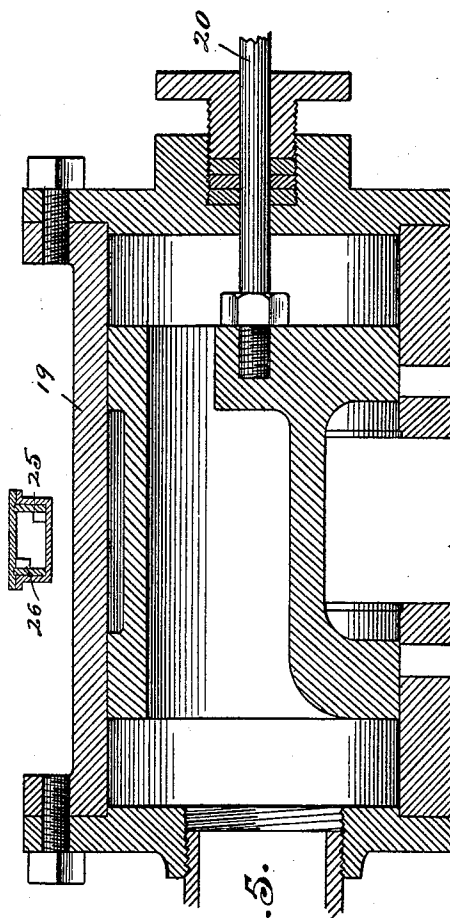
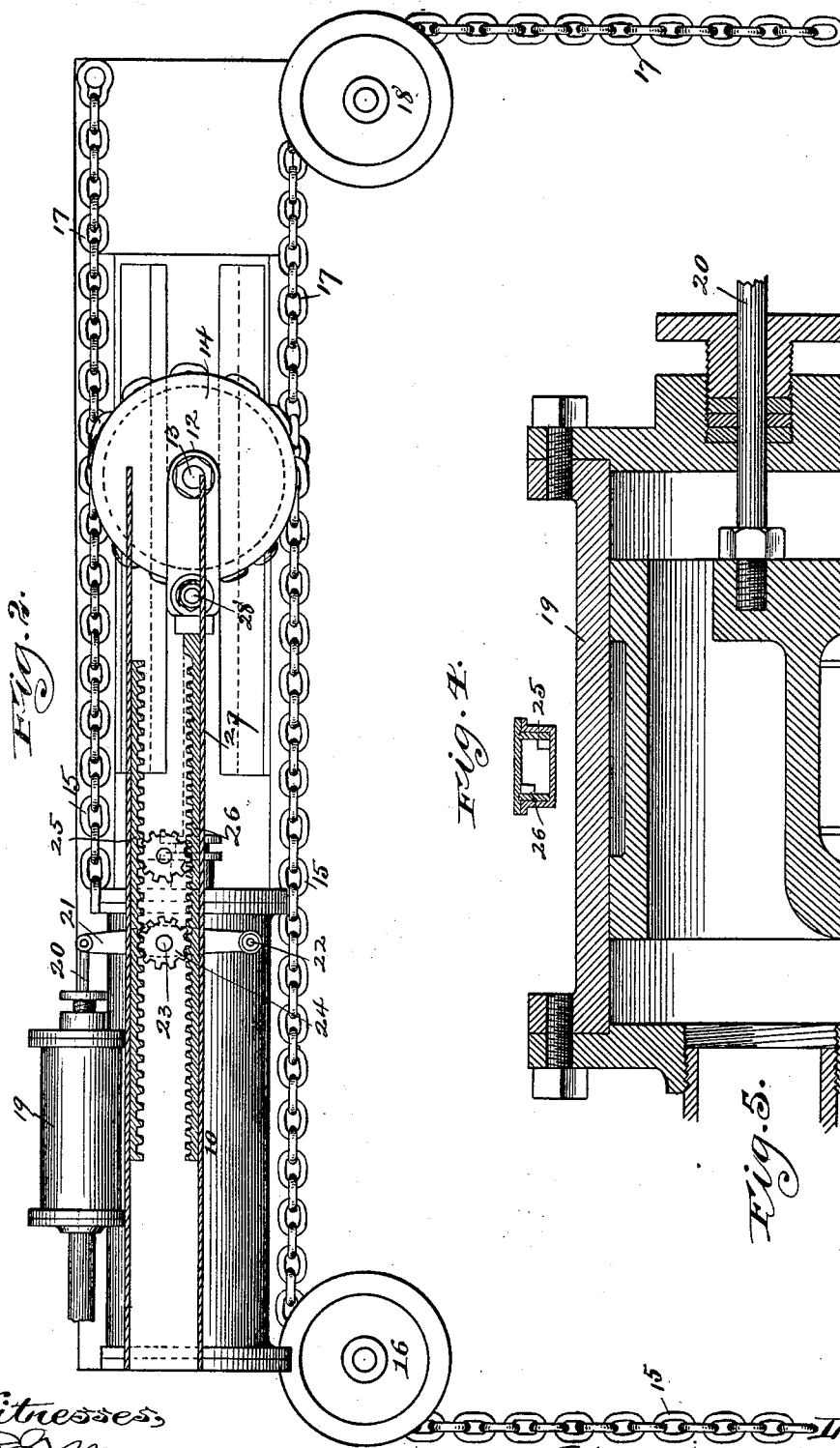
(No Model.)

3 Sheets—Sheet 2.

E. HEYDE.
STEAM STEERING APPARATUS.

No. 521,652.

Patented June 19, 1894.



Witnesses,
J. B. Goodwin
J. B. Goodwin

Inventor,
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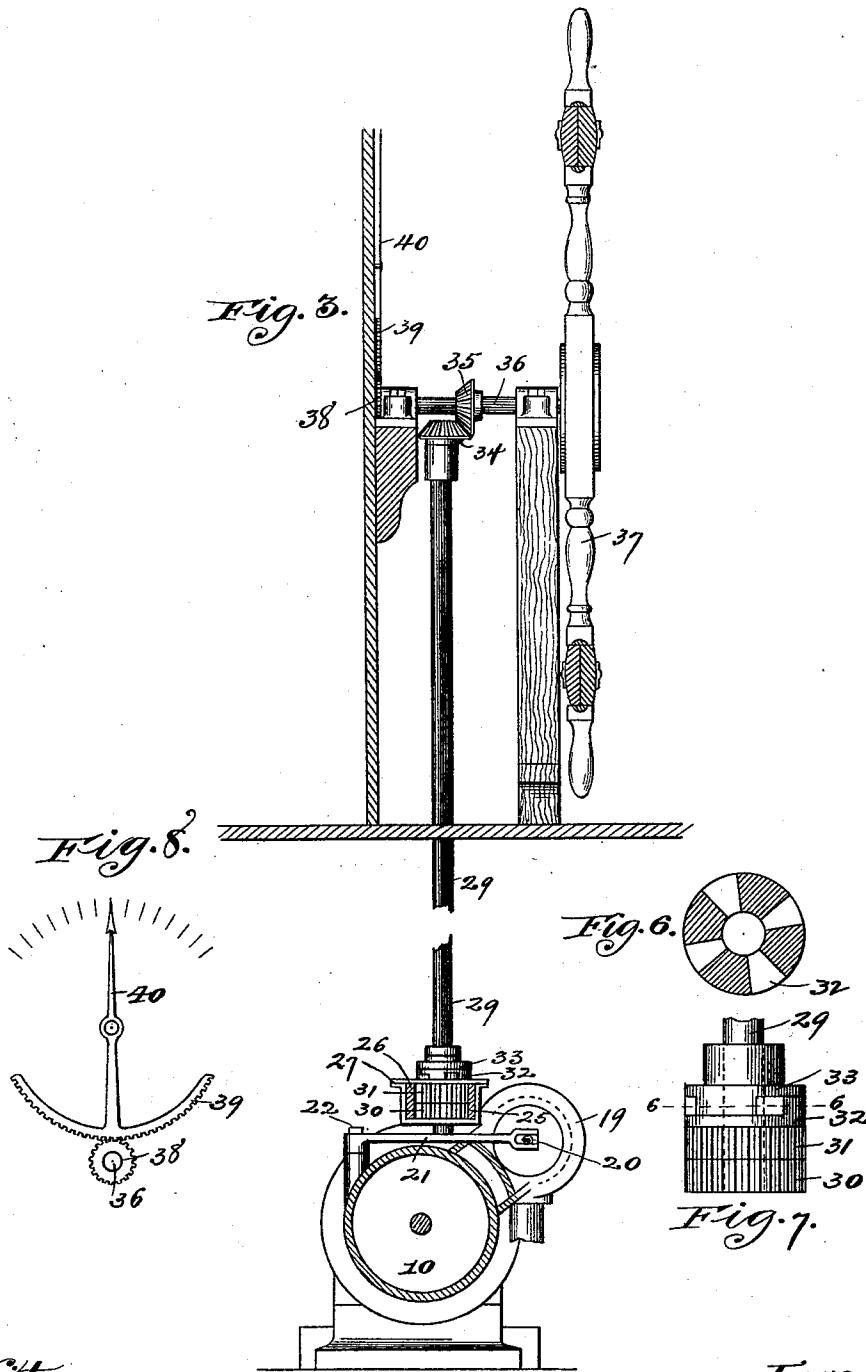
(No Model.)

3 Sheets—Sheet 3.

E. HEYDE.
STEAM STEERING APPARATUS.

No. 521,652.

Patented June 19, 1894.



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UNITED STATES PATENT OFFICE.

EDWARD HEYDE, OF EAST SAGINAW, MICHIGAN, ASSIGNOR TO THE WICKES BROTHERS, OF SAME PLACE.

STEAM STEERING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 521,652, dated June 19, 1894.

Application filed December 23, 1893. Serial No. 494,566. (No model.)

To all whom it may concern:

Be it known that I, EDWARD HEYDE, of East Saginaw, Michigan, have invented certain new and useful Improvements in Steam Steering Apparatus, of which the following is a specification.

This invention relates to certain improvements in steam steering apparatus for controlling the rudder of a vessel.

10 The apparatus comprises a steam cylinder having a working piston carrying two sheaves or a double grooved sheave over which run chains or cables, each having one end made fast and the other end carried around a suitable guiding or directing sheave and made fast to the tiller or other mechanism for shifting the rudder; a slide valve for controlling the admission of the steam to the cylinder and valve shifting mechanism comprising an operating shaft with means for rotating it, and gearing between the operating shaft and the valve rod whereby the valve is shifted.

In this type of steering apparatus, the only manual labor necessary to be performed is the shifting of the valve, the steam acting upon the piston driving it one way or the other, and through the piston rod and cables operating to take up and pay out the cables which effect the movement of the rudder. Steam pressure is maintained on both sides of the actuating piston and normally holds the rudder in the position to which it is set, the valve being shifted only when it is desired to change the course of the vessel.

35 My invention relates principally to the manner of connecting the cables with the piston rod and to the gearing whereby the valve movements are effected.

In the accompanying drawings, Figure 1 is a side elevation of the cylinder and its piston rod, showing the cable sheave in edge view, the operating shaft and its operating wheel partly broken away. Fig. 2 is a sectional plan view, the section being taken on the line 2—2 of Fig. 1. Fig. 3 is a transverse section through the cylinder on the lines 3—3 and through a part of the gearing on the line y—y, and showing the valve chest in end elevation. Fig. 4 is a sectional detail of a casting containing two reciprocating racks forming a part of the valve gear. Fig. 5 is a longitudinal sectional view of the valve. Fig. 6

is a sectional detail of a clutch mechanism. Fig. 7 is an enlarged detail in elevation of the lower end of the operating rod and of the clutch and two pinions carried thereby. Fig. 8 is a detail view of an indicator and its operating pinion and shaft.

In the drawings, I have shown the operating shaft as arranged in a vertical position and extending from the pilot house, represented upon an upper deck, into a lower deck or compartment containing the steering apparatus, and I have not shown the connection of the cables to the tiller. It will be understood that the operating rod may be divided and its sections connected by belts or otherwise so as to permit the placing of the steering apparatus toward the stern of the boat, while the pilot house and wheel will be usually located toward the bow.

In the drawings, 10 represents the steam cylinder; 11 the piston rod, and the piston is indicated in dotted lines in Fig. 1. Said piston rod has a yoke 12 in whose extremities is journaled a pinion or stud 13 carrying a double grooved sheave 14.

Referring now to Fig. 2, 15 represents a chain cable which is made fast at one end and is turned over the sheave 14 running in the upper groove thereof, and is thence carried back to the cylinder and turned over a guiding sheave 16. The free end of this cable will be connected with the tiller or other means for controlling the rudder. A cable 17 is secured at one of its ends and is carried around the sheave 14 in its lower groove and passing over the sheave in a direction opposite to that of the cable 15 is returned in line with cable 14, as clearly shown in Fig. 2, and carried around a deflecting sheave 18, its free end being connected also with the tiller.

It will be obvious that the reciprocation of the piston rod carrying the double grooved sheave will operate to take up and pay out these cables alternately and that if they be connected to the tiller the movements of the rudder are thus controlled. In order to admit steam alternately upon opposite sides of the piston to effect its reciprocation and the control of the rudder as mentioned, I employ a slide valve of any suitable construction, as

shown in Fig. 5, and which will be mounted in a valve chest 19, arranged preferably upon the side of the cylinder as shown in Fig. 3. The valve rod 20 is pivotally connected to the lever 21, the opposite end of said lever being pivoted on the stud 22. Intermediate its ends this lever has a stud 23 carrying a pinion 24 which inmeshes with the teeth of the racks 25, 26, which are mounted in the box-like guide 27. These racks, as clearly shown in Fig. 4, have teeth of a length equal to half the width of the rack bars, the rack 25 having its teeth upon its lower edge, and the rack 26 having its teeth upon its upper edge. The rack 25 is free to be shifted manually and independently of the movements of the piston, so as to cut off the steam at any point desired while the rack 26 is connected by the stud 28 with the piston and reciprocates only with the piston travel.

29 represents the operating rod which is rotatably mounted in a vertical position and bears upon its lower end a fixed gear 30 which inmeshes with the teeth of the rack 25.

31 represents a loose gear on the shaft 29 above the gear 30 and whose teeth are inmeshed with the teeth of the rack 26. This gear being normally free, provision must be made for securing it to rotate with the operating shaft and this I accomplish by means of a simple clutch (Fig. 6) consisting of two members through which the shaft 29 passes, the lower member marked 32 being secured with the gear 31 and the upper member 33 being secured upon the shaft 29. A bevel pinion 34 is secured upon the upper end of the shaft 29 and is inmeshed with the pinion 35 on a short shaft 36 which carries the steering wheel 37 at one end and a small gear 38 upon its opposite end. The gear 38 (see Fig. 8) is in mesh with the teeth of a sector 39 carrying an indicator needle 40.

The operation may be understood by assuming the moving parts to be in the position shown in Figs. 1, 2 and 5, in which position the piston is at half stroke and the steam ports are closed. If now the expansive power of the steam be sufficient to return the piston to the limit of its in stroke, the piston rod will carry with it the rack 26, which will engage the loose pinion of the pair carried by the operating shaft and hence will not affect the position of said shaft. But said rack 26 is also in mesh with the wide faced pinion 24 which is mounted upon the pivoted lever 21. The pinion 24 is also engaged with rack 25 and the latter is engaged with the fixed pinion 30 on shaft 29 so that rack 25 remains stationary and pinion 24 rolls thereon. The travel of the pinion 24 causes the swinging of lever 21 and the forward movement of the valve, which movement, if uninterrupted, would open the port in front of the piston for the entry of steam and also uncover the exhaust behind the piston. This movement may, however, be interrupted at any point by

the steers-man turning wheel 37 and through the operating rod 29 and its fixed pinion 30 acting upon rack 25 arresting the movement of the gear 24, lever 21, and valve rod 20. In order to effect the movement of the valve in the opposite direction by means of the steering wheel, said wheel is turned in the opposite direction and through the medium of the tight pinion 31, rack 26, pinion 24 and lever 21, the valve is moved so as to uncover the port and admit steam behind the piston.

The apparatus above described is easily controlled and highly sensitive. Normally steam is maintained on both sides of the piston which preserves its equilibrium or restores it after it is disturbed by the manual movement of the valve.

While I have specified the sheaves and chains for forming the connection between the piston rod and the tiller, there may be conditions in which the piston rod may be connected directly to the tiller, or other connecting means than those shown employed.

I claim—

1. In a steam steering apparatus, the combination with a steam cylinder and its piston rod, of a cross head carried by said piston rod, two sheaves carried by the cross head, chains each having one end made fast and carried over said sheaves respectively in opposite directions and connected to the tiller, a steam valve, a valve gear actuated by the piston-rod, and means, for manually controlling the valve independently of the movements of the piston rod, substantially as described.

2. In a steam steering apparatus, the combination with a steam cylinder and its piston and piston rod, of a valve for controlling the cylinder ports, a swinging lever pivoted to the valve rod, a pinion carried by said lever and two sliding racks inmeshed with the pinion, one of said racks connected to the piston rod and means for moving the other rack independently, substantially as described.

3. In a steam steering apparatus, the combination with a steam cylinder and its piston and piston rod, of a slide valve for controlling the cylinder ports, a swinging lever pivoted to the valve rod, a pinion carried by said lever, two sliding racks inmeshed with the pinion, one of said racks connected with the piston rod and moving therewith, a steering wheel, an operating rod turned thereby, a loose pinion carried by said rod and inmeshed with the rack connected to the piston rod, a pinion secured to turn with the operating rod and inmeshed with the other of said racks and a clutch, one member of which is carried by the loose pinion and the other by the rod, substantially as described.

EDWARD HEYDE.

Witnesses:

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HARRY G. ADAMS.