(No Model.) 2 Sheets—Sheet 1.

T. J. SHAW & J. M. SPIEGLE.

TOWING MACHINE.

No. 383,917. Patented June 5, 1888.

Fig. 1.

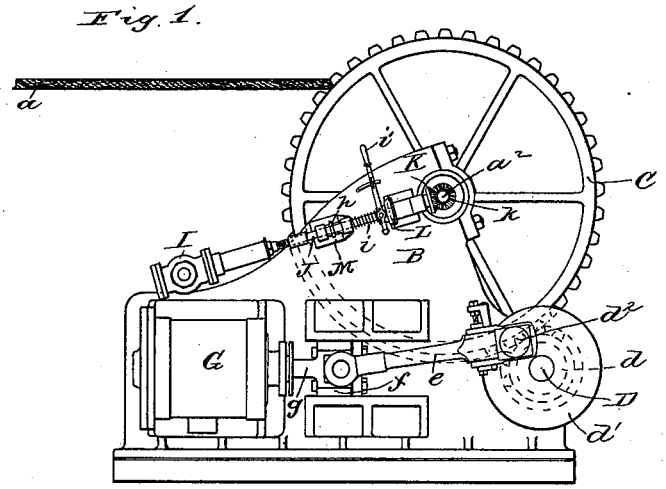
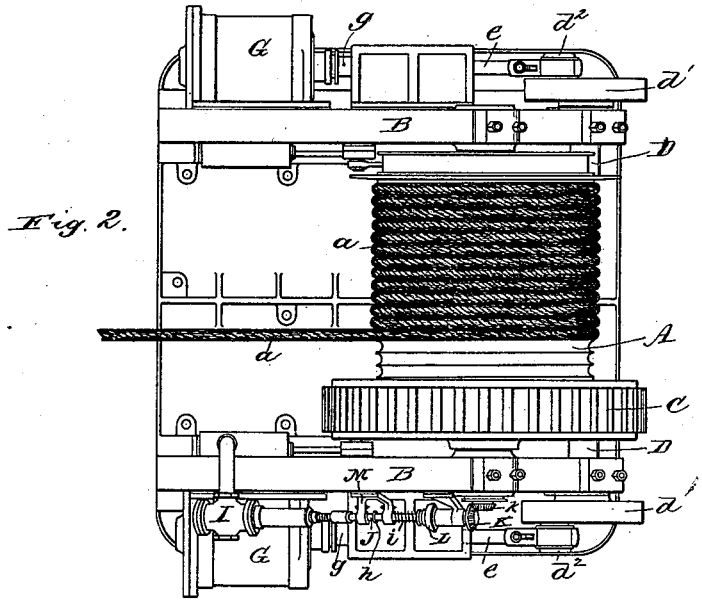


Fig. 2.



Witnesses:
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E. B. Smith.

Inventors:
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(No Model.) 2 Sheets—Sheet 2.

T. J. SHAW & J. M. SPIEGLE.

TOWING MACHINE.

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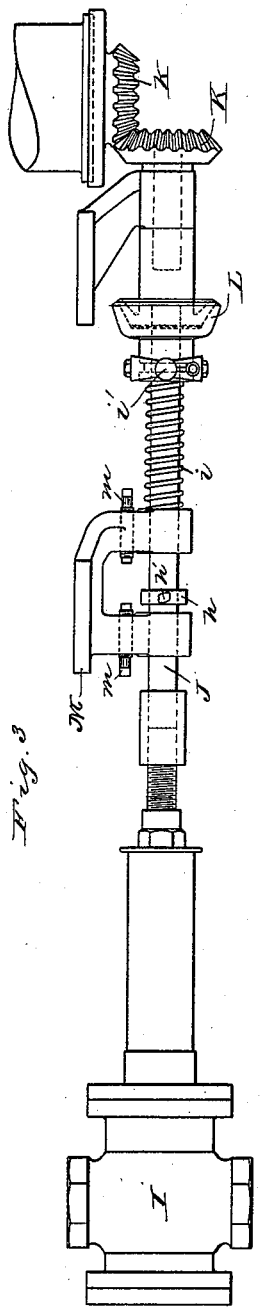

Fig. 3.

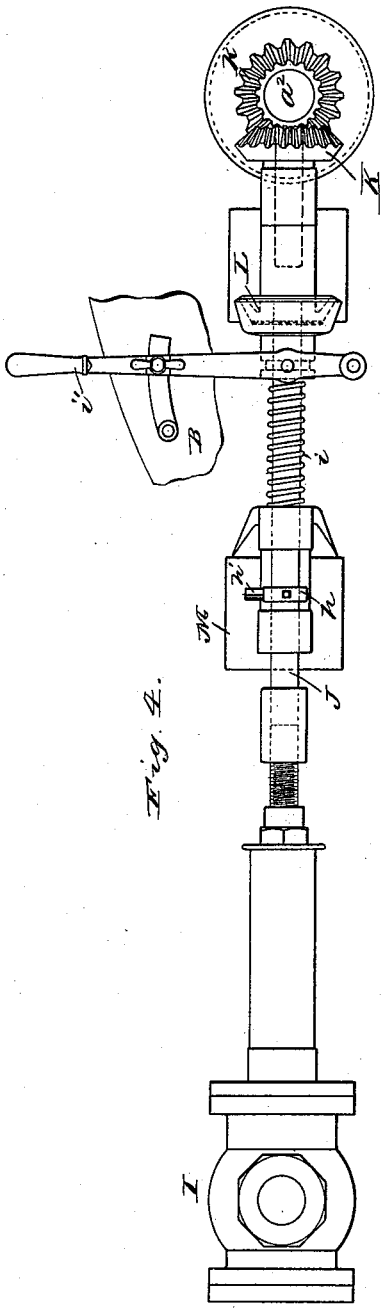

Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

T. JACKSON SHAW, OF WILMINGTON, DELAWARE, AND JOHN M. SPIEGLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE BOSTON TOW BOAT COMPANY, OF BOSTON, MASSACHUSETTS.

TOWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 383,917, dated June 5, 1888.

Application filed February 21, 1888. Serial No. 264,836. (No model.)

To all whom it may concern:

Be it known that we, T. JACKSON SHAW, of Wilmington, Delaware, and JOHN M. SPIEGLE, of Philadelphia, Pennsylvania, citizens of the United States, have invented certain new and useful Improvements in Towing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

When one vessel is being towed by another in a turbulent sea, the tow-line, cable, or hawser is subjected to sudden alternating degrees of tension consequent upon the changing relations of the vessels to each other as they ride upon the waves or settle in the troughs of the sea, and the sudden strains on the cables are sometimes so enormous as to be beyond the endurance of the cables, and the latter are therefore liable to be broken.

The object of our invention is to obviate this difficulty. This object we accomplish by providing a balancing cable-drum, the balancing being effected by a steam or air engine so geared to the drum that the normal pressure of the engine cylinder or cylinders will balance the normal strain on the cable; but if the strain on the latter be suddenly increased the cushioning effect of the steam or air in the engine cylinder or cylinders will permit the cable to "pay out" somewhat, and thus yield to the sudden strain, thereby rendering the action of the cable yielding or elastic. To counterbalance the increased strain on the cable, we provide a pressure-regulating valve, which is geared to the shaft of the cable-drum and connected with the engine cylinder or cylinders, so that when the strain on the cable causes the latter to pay out the turning of the drum-shaft will increase (by means of the regulating-valve) the pressure in the said cylinders, and thus quickly counteract the tendency of the cable to pay out, and when the lessening strain on the cable permits the drum to be turned (by the pressure regulating of the engine cylinder or cylinders) the reverse movement of the drum-shaft will reverse the screw of the regulating pressure-valve to bring the pressure down to equalize the lessening strain on the cable. Thus the cable-drum becomes a compensating winding-drum to pay out the cable somewhat when the latter is subjected to a sudden strain, (to meet which the engine-power is quickly raised by the movements of the drum,) and to "haul in" the cable again when the strain is relaxed, the compensating movements of the said drum preventing the cable from being broken by the sudden strains to which it may be subjected. We prefer to regulate the balancing-pressure of the engine cylinder or cylinders within certain fixed limits by providing stops to limit the rotation of the screw-shaft of the pressure regulating-valve, the said shaft consisting of two parts having a friction-clutch connection to permit the positive portion of said shaft to move when the rotation of the other part thereof is arrested.

To enable others skilled in the art to fully understand our invention, we will now more particularly describe it in connection with the accompanying drawings, in which—

Figure 1 is an end elevation of an apparatus or machine embodying our invention. Fig. 2 is a plan view of the same. Figs. 3 and 4 are detail views to show the regulating pressure-valve and its screw-shaft and connections.

A denotes the cable-drum and *a* the cable partly wound thereon. This drum is mounted on a substantial frame, B, which is to be fixed to the deck of the towing-vessel. The drum is provided with a gear-wheel, C, meshing with a smaller gear, *d*, (see dotted lines, Fig. 1,) on a shaft, D, having crank-disks *d'*, provided with crank-pins d^2, said crank-pins being connected by pitmen *e* with the engine cross-heads *f*, sliding in suitable ways on the frame B, and having piston-rods *g*, the pistons of which are within the cylinders G. The shaft D is thus properly the crank-shaft of the engine.

It will be obvious that the engine herein shown is a two-cylinder steam or air engine, the same being so geared, arranged, and proportioned that the mean normal pressure on the pistons thereof will be sufficient to balance the normal load or strain on the cable; but if this strain be increased or diminished it is desirable to increase or diminish the pressure in

the engine-cylinders. To effect this result, we provide an automatic regulating-valve, I, through which the steam to the engine cylinder or cylinders passes, said valve being in any suitable or convient location between the boiler and engine, but being preferably closely adjacent to the cable-drum and engine, as shown in the drawings. This regulating or reducing valve may be of any suitable or well-known form, and by being opened, so as to admit of the passage of more or less steam, the pressure in the engine cylinder or cylinders may be regulated as may be desired. By opening the valve wider the steam-pressure of the engine is increased, and by partly closing the valve the pressure is reduced, as is familiar to those skilled in the art to which our invention relates. The regulating-valve I is operated by a screw spindle or shaft, J, provided with a bevel-gear, K, meshing with a similar gear, *k*, on the shaft a^2 of the drum A. The spindle or shaft J is in two parts connected by friction-clutch L, normally held in working position by the spring *i*, but capable of separation by the hand-lever *i'*.

The shaft J is provided with a collar, *h*, having a projection, *h'*, the said shaft passing through the arms of a bracket, M. Tapped in the said arms are screws *m*, which may be adjusted in and out as desired, the said screws being within the range of the pin or projection *h'* of the collar *h*, so that if the shaft J be moved far enough in either direction to bring the said collar to such position as to cause the pin *h'* to strike either of the said screws the rotation of the said shaft will be arrested, excepting that portion thereof which carries the positive part of the clutch, and thus the varying pressure of the pressure-regulating valve can be regulated within certain fixed limits, determined by the position of adjustment of the screws *m*.

The operation of our invention is as follows: The pressure of the engine-cylinders G will normally counterbalance the strain or lead on the cable, and the drum will thus remain stationary; but when, owing to the pitching of the vessels, a sudden strain comes on the cable the latter will pay out somewhat, and in so doing the steam or air in the engine-cylinders will have a cushioning effect to prevent injurious jerks on the cable. As the cable pays out, the drum will be turned, and thus the bevel-gear *k* on the drum-shaft will turn the screw shaft or spindle J, through the gear K, to open or enlarge the steam-passage of the pressure-regulating valve I, and thereby increase the steam-pressure of the engine cylinder or cylinders to counterbalance the load on the cable. When the strain is lessened, these operations are reversed, and the pressure is reduced to the equality of the load on the cable as the latter is hauled in by the reverse turning of the drum by the engine. The movements of the screw-shaft J to vary the pressure of the pressure-regulating valve will be restricted within certain limits by the screws *m*, as above described, and if the said shaft be not turned far enough in either direction to have its movements thus limited the collar *h*, with its pin or projection *h'*, will simply oscillate back and forth between the said screws as the weight of the load on the cable is increased or diminished.

It will of course be understood that we do not limit our invention to the details herein shown and described, as any well-known form of engine or any well-known form of gearing mechanism for the pressure-regulating valve may, if desired, be employed instead of the particular form of engine and pressure-valve mechanism hereinbefore set forth.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a towing-machine, the combination, with a cable-drum, of an engine the shaft of which is geared to said drum to balance the load on the cable, and a pressure-regulating valve located in the steam-passage to the engine cylinder or cylinders and operatively connected with the shaft of said drum, whereby the pressure of the engine cylinder or cylinders is increased as increased strain on the cable causes the latter to be paid out and is diminished as the strain on the cable is lessened and the latter is hauled in, substantially as set forth.

2. In a towing-machine, the combination, with a cable-drum, of an engine the shaft of which is geared to said drum, a pressure-regulating valve located in the steam-passage to the engine, a screw spindle or shaft geared to the shaft of said drum and serving to operate said valve, and stops for arresting the movements of said spindle and thereby regulating the pressure governed by the said valve within certain fixed limits, substantially as set forth.

3. In a towing-machine, the combination, with a cable-drum, an engine, and a pressure-regulating valve, of a screw shaft or spindle for the said valve, geared to the drum-shaft and formed in two parts, and a friction-clutch for connecting the said parts, substantially as set forth.

4. In a towing-machine, the combination, with a cable-drum, an engine, and a pressure-regulating valve, of a screw shaft or spindle for the said valve, and which is geared to the drum-shaft and formed in two parts, a friction-clutch for connecting the parts of the said shaft, and stops for limiting the rotary movements of one part of the said shaft while the other part thereof having the positive member of the said clutch may still turn, substantially as set forth.

5. In a towing-machine, the combination, with a cable-drum and an engine the shaft of which is geared to the said drum, of the pressure-regulating valve I, connected with the en-

gine cylinder or cylinders, the screw shaft or spindle J, formed in two parts and having the gear K, a clutch for connecting the parts of the said spindle, the gear *k* on the drum-shaft, the collar *h*, fixed to the said spindle and having the pin or projection *h'*, and the bracket M, having the screws *m*, substantially as set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

T. JACKSON SHAW.
JOHN M. SPIEGLE.

Witnesses:
L. B. JERVIS,
WM. K. THOMSON.