No. 862,748. PATENTED AUG. 6, 1907.

T. S. MILLER.

CONVEYING APPARATUS.

APPLICATION FILED JULY 1, 1904.

4 SHEETS—SHEET 1.

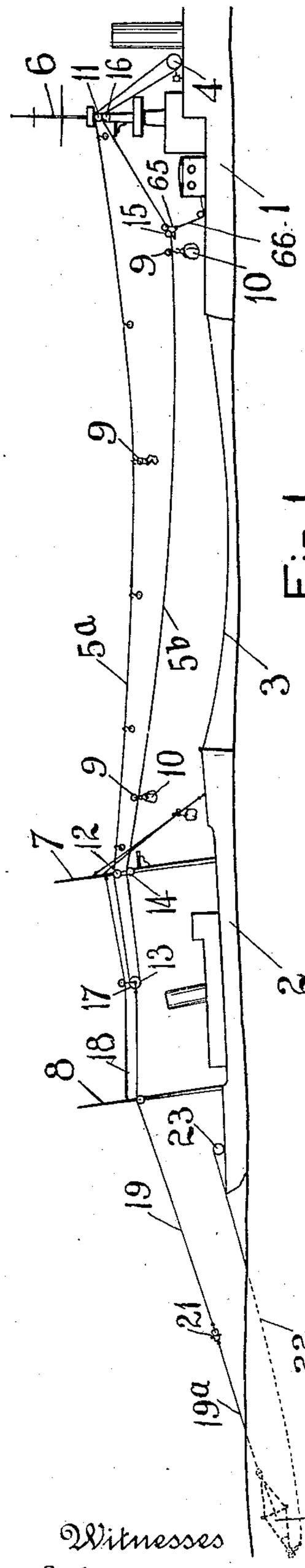

Fig. 1

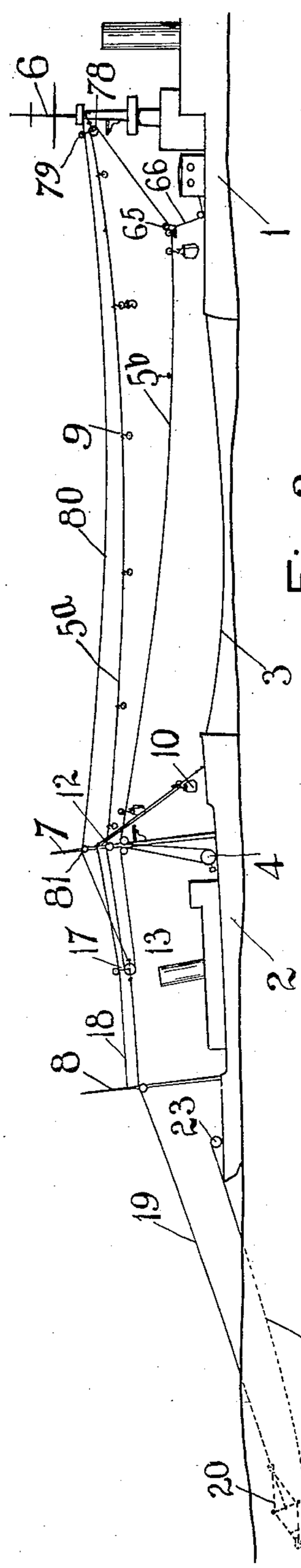

Fig. 2

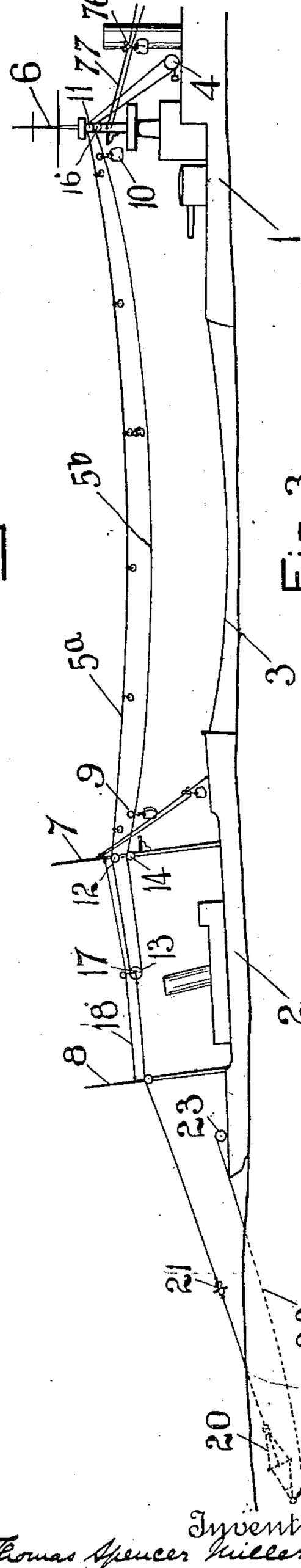

Fig. 3

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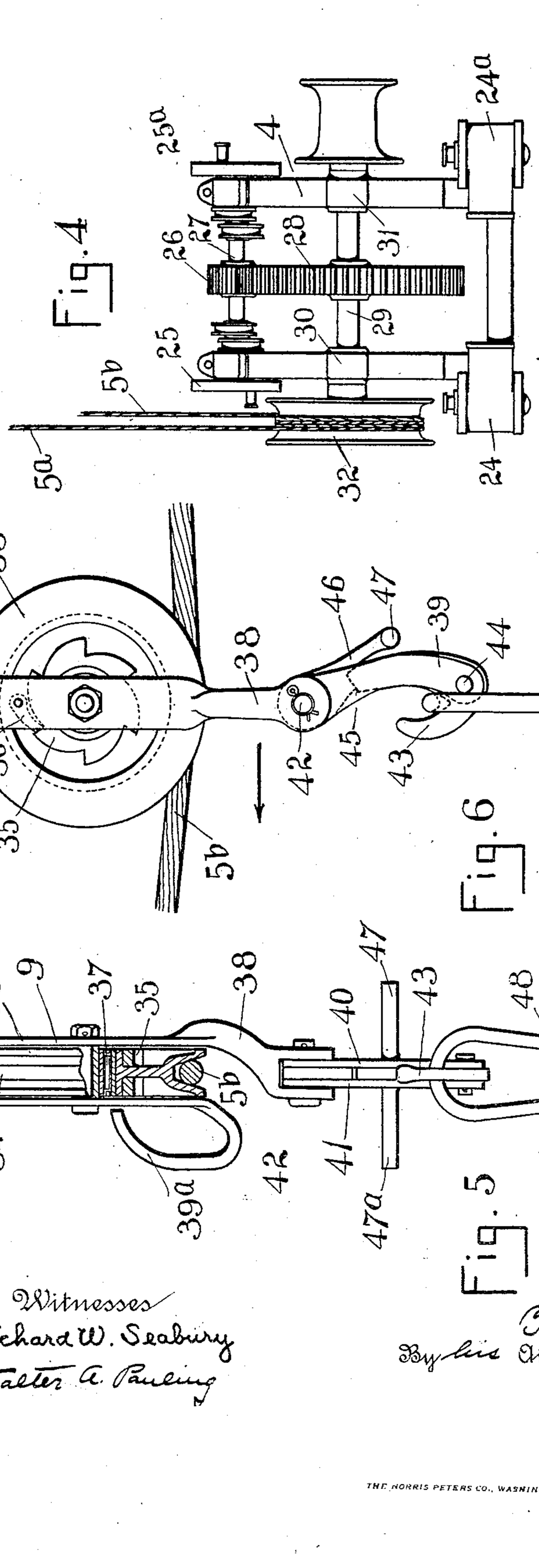

Fig. 4

Fig. 6

Fig. 5

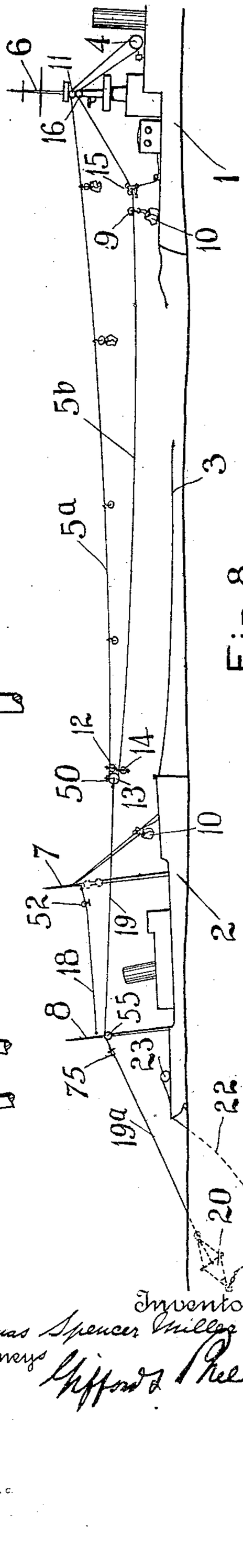

Fig. 8

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4 SHEETS—SHEET 3.

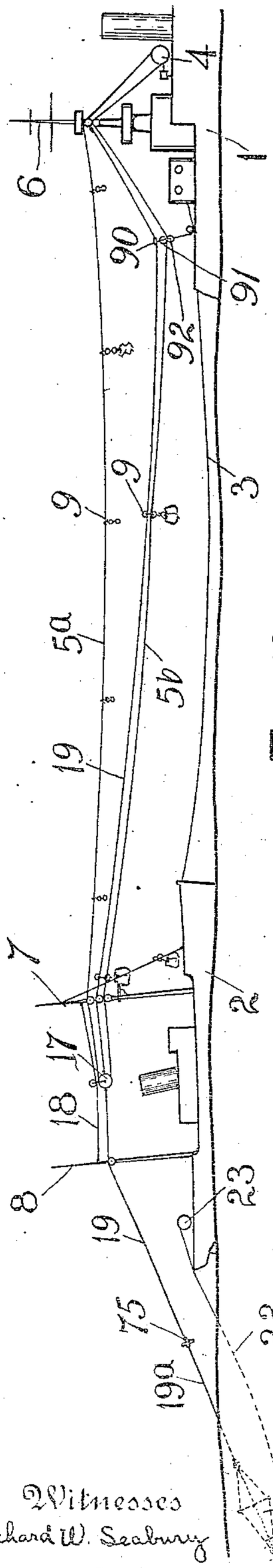

Fig. 16

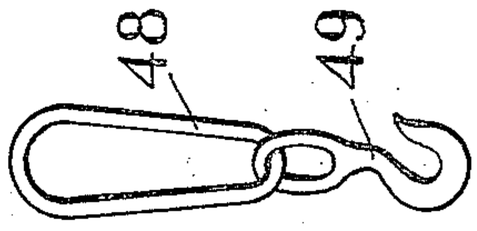

Fig. 7

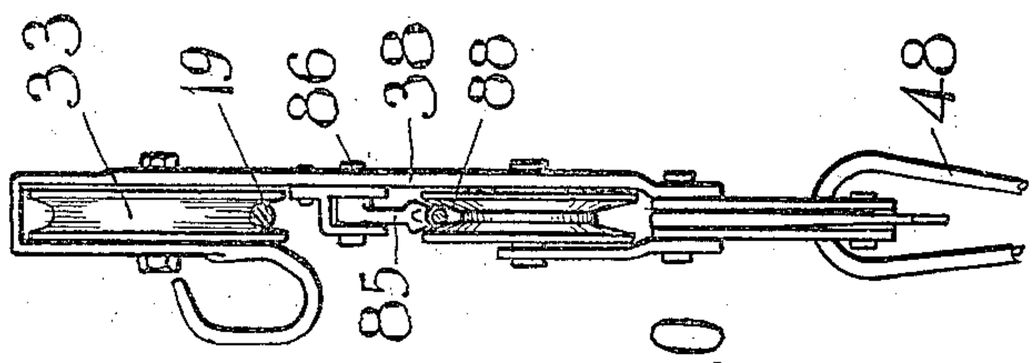

Fig. 20

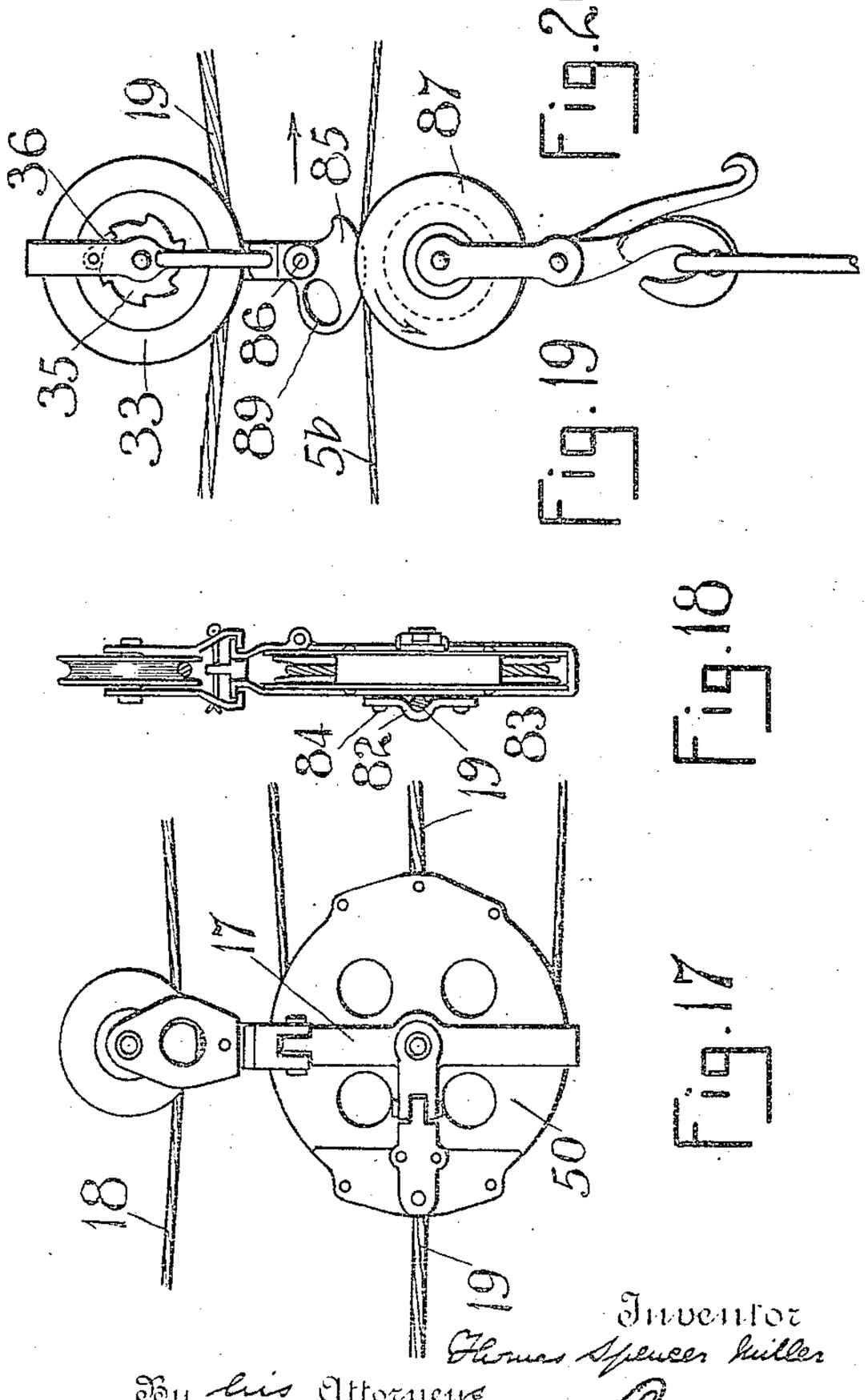

Fig. 19

Fig. 18

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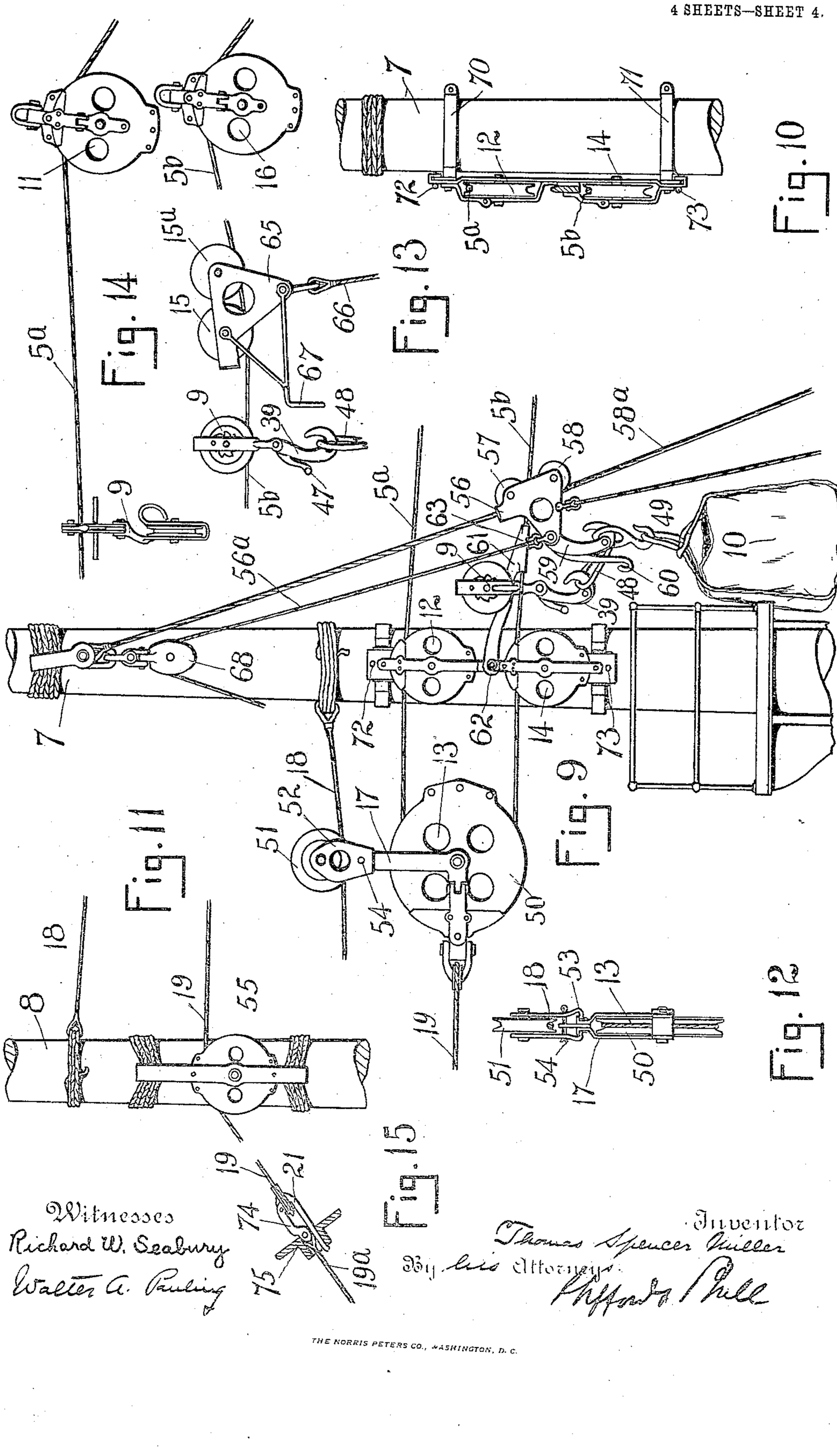
4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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CONVEYING APPARATUS.

No. 862,748. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed July 1, 1904. Serial No. 214,909.

To all whom it may concern:

Be it known that I, THOMAS SPENCER MILLER, a citizen of the United States, and a resident of South Orange, Essex county, and State of New Jersey, have invented a new and useful Improvement in Conveying Apparatus, of which the following is a specification.

My invention relates particularly to conveying apparatus and it consists in certain novel parts and combinations of parts particularly pointed out in the claims concluding this specification.

In the accompanying drawings, I have shown my invention applied in forms which are at present preferred by me, but it will be understood that various modifications and changes may be made without departing from the spirit of my invention and without exceeding the scope of my claims.

In the accompanying drawings, Figures 1, 2, 3, 8 and 16 illustrate diagrammatically various forms of apparatus embodying my present invention. Fig. 4 shows in detail the winch for operating the conveyer rope. Figs. 5 and 6 are, respectively, side and end views of the load carriage. Fig. 7 is a detail of one of the parts. Fig. 9 is a detail of the apparatus about the mast-head of the towed ship. Fig. 10 is an end view of a part of the apparatus shown in Fig. 9. Fig. 11 is a view of the main mast of the towed ship. Fig. 12 is an end view of the tension carriage shown in Fig. 9. Figs. 13 and 14 show the arrangement of the parts of my apparatus over the rear portion of the towing ship. Fig. 15 is a detail view of a coupling in the sea anchor line. Figs. 17, 18, 19 and 20 are details of the modification of Fig. 16.

The following is a description of the structure shown in the accompanying drawings.

In all the figures, 1 is the towing boat; 2 the towed boat; 3, the tow line connecting the same. 4, the operating winch. 5^a and 5^b are two strands of an endless transporting and supporting cable. 6 is a support on the towing ship. 7, a support on the towed ship, which in this instance, is shown as the foremast of the collier. 8 is another support, shown as the main mast of the collier. 9 is the load carriage. 10 is the load. 11, 12, 13, 14, 15, 16 are pulleys supporting the endless traversing rope. This endless traversing rope leads from the winch 4 over the pulley 11 on the towing ship, thence to the pulley 12 on the towed ship. 13 is a pulley mounted in a tension carriage. The rope is thence led over pulley 14 on the foremast of the towed ship, thence across the span and under the pulleys 15 and 15^a, thence over the pulley 16 on the main mast of the towing ship. 17 is the tension carriage shown on the towed ship between the masts 7 and 8, mounted on the stay 18. Attached to the tension carriage 17 and extending rearward, is the line 19, to the end of which is attached the sea anchor 20. The sea anchor line 19 is composed of two parts, namely: 19 and 19^a, which are held together by a releasing hook 21, which will be more fully described hereafter. 22 is a trip line for inverting the sea anchor when it is desired to destroy its pulling power. 23 is a winch on the after part of the towed ship for winding in the trip line 22.

In Fig. 4, is shown an ordinary double cylinder reversible link-motion-engine or winch. 24 and 24^a are cylinders. 25 and 25^a are crank wheels. 26 is a driving pinion on crank shaft 27. The pinion 26 drives the gear 28 mounted on the shaft 29, which shaft is mounted in bearings 30 and 31. On one end of this shaft 29 is located a drum 32 having a grooved face. It will be observed in the operation of this winch that the drum 32 is caused to revolve in either direction. The strand 5^b of the endless rope is led down on one side of the drum 32 while strand 5^a is being paid out at the same rate of speed on the opposite side of the drum.

Figs. 5 and 6 represent two views of a preferred form of hanger, truck or load carriage. 33 is a wheel free to travel on the strand 5^b of the endless supporting rope. The wheel 33 is provided with a V-groove 34, which pinches somewhat the strand 5^b. 35 is a ratchet wheel secured to the side of the wheel 33. 36 is a pawl engaging the same. It will be observed that while the wheel is free to revolve in one direction, it cannot revolve in the opposite direction. 37 are antifriction bearings for the support of the wheel 33. 38 is a pendent portion of the frame which is part of a complete forging or casting which passes upwardly to the side of the pulley, curving over the top and returning down the opposite side of the pulley and terminating in a handle, 39^a. At the lower end of this frame is a drop hook 39. This hook is composed of two side pieces 40, 41, pivoted on the pin 42. 43 is the tongue of a hook which is pivoted at 44 and which is provided with a shoulder 45. 46 is a lever which, when set, resists the turning of the hook 43. 47, 47^a are horizontal extensions to the lever 46. It will be clearly seen that if the bars or extensions 47 of the hook 46 are pushed in a direction opposite to the arrow, the point of the hook 43 will collapse and the load will drop. 48 is a bail supporting the load, more particularly shown in Fig. 7. 49 (Fig. 7) is the hook to which the load is attached.

In the practice of conveying loads by a wire rope by a continuously moving endless rope, it has been found expedient to operate the same at a moderate rate of speed,—600 feet per minute is about the maximum speed which has, at the present time, been attained; 300 feet per minute is the average. The reason why the speed must be slow is because the loads must be placed on a continuous moving rope and taken therefrom at short intervals of time. In the usual practice, loads are

placed on the traversing rope by any desired grip. Should the speed be great, the load will be jerked and the grip or rope injured. In the delivery of the load, slow speed is necessary. It will be observed that in my invention the load is pushed off an inclined fixed track and attains some speed before reaching the cable. The load then starts on its downward route by gravity and considerably faster than the speed of the endless rope. Should the endless rope be at rest, the load-carriage will travel considerably more than one-half the distance between the ships. In my system, I prefer to run the conveying rope at a relatively low rate of speed—say 300 feet per minute, or else vary the speed so that when the load approaches the terminal, its speed will be slow. The load carriage traveling by gravity, may travel at the rate of nearly 1000 feet per minute, depending upon the grade. As soon as the load carriage 9 has traveled as far as it will by gravity, the disposition will be to return down grade again to the center of the span. This, however, is resisted by the ratchet 35 and pawl 36 in connection with the V-shaped groove 34 (Figs. 5 and 6) and the gripping device (Figs. 19 and 20); that is to say, the wheel (Figs. 5 and 6) is prevented from revolving by the ratchet and pawl and it is also prevented from slipping on the rope by the V-shaped groove. In Figs. 19 and 20 the pawl or grip prevents the load carriage from movement except in one direction. The pulley comes to a rest relative to the rope. As the rope, however, is traveling it insures the load completing its journey to the place where it will be deposited.

I believe I am the first to operate a conveying device by combining a load carriage traveling by gravity upon a supporting rope and provided with means whereby the load may be carried on an up grade by the use of the longitudinal motion of the supporting rope, or of an auxiliary rope.

In Fig. 9, is shown the method of fitting up the foremast 7, of the towed ship. The tension carriage 17 consists of a snatch-block 50, containing the pulley 13 mounted in the usual fashion. The block 50 is supported by a pulley 51 mounted in a frame 52. It will be noted (see Fig. 12) that the pulley of block 50 is supported by flanges 53 which are capable of carrying the weight of the block 50. This block 50 is, therefore, adapted to move in a horizontal direction relative to the frame 52 and may do so by the removal of the pin 54. The pin 54 is very light and easily broken. Its use will be explained hereafter. 55 is a pulley on the main mast 8 on the towed ship 2, which serves to support the sea anchor line 19. 56 is a truck mounted on wheels 57 and 58 running on an inclined fixed cable 58^a and containing a drop-hook 59 similar to that described in Figs. 5 and 6. The truck 56 is hoisted by rope 56^a which is led over the pulley 68, thence down to the deck where it may be operated by a winch or any other hoisting device. The load 10 is supported by the hook 49 carried by the drop-hook 59. The ring 48 is placed by hand upon the drop-hook 39 of the load carriage 9. A pull upon the lever 60 of the drop-hook 59 will cause the load to fall and thus be transferred to the hook 39 of the load carriage. 61 is a short section of fixed trackway pivoted at 62 and provided with a shoe 63. When the load carriage 9 has received the load it is pushed off of the track 61 onto the cable 5^b. It then begins its journey down the catenary curve; the momentum of the load carrying it a considerable distance beyond the center of the span. As before explained, the endless rope is traveling at a moderate rate of speed which causes the load carriage 9 to complete its journey to the place of delivery. The method of delivering loads to the endless traversing rope is illustrated in Fig. 9.

Fig. 13 illustrates the load carriage 9 approaching a haul-down-block 65. This block contains two wheels 15 and 15^a, and is held down by rope 66 leading to the deck of the ship. 67 is a forked bail reaching out toward the carriage 9. When the carriage 9 comes in contact with the block 65, the fork 67 collides with cross bar 47 and the load is thereby released. The truck 9 is then taken from the branch of the cable 5^b after which it is placed upon the branch 5^a in an inverted position for returning to the towed ship (see Fig. 14).

I have now described the operation of transferring the loads between two supports.

An important feature of my invention provides against the damage caused by an accidental breakage of the tow-line while under way. It is evident that when coaling at sea it will be always desirable to have as long a tow-line as possible, for safety. It is also evident that in a heavy sea the ships may plunge in such a way as to part the tow-line. Therefore, it is essential that provision be made whereby in the event of breakage of the towline, the lines may free themselves from the ships.

In Fig. 9, the pulleys 12 and 14 are shown in a frame. These pulleys inclose both branches 5^a and 5^b of the supporting or transporting rope. It will be noted that in Fig. 10, this frame is supported on the flanges which form a part of bands 70 and 71 on the mast. These flanges resist vertical stress upon the pulley but do not resist the horizontal motion of the frame, excepting that supported by the pins 72 and 73. These pins are of very light construction and are ample to take care of any horizontal stress caused by the motion of ropes 5^a and 5^b which pass over the pulleys 12 and 14. It has already been explained that the pulley 50 and tension carriage 17 is adapted to move horizontally relative to the carriage 52. In operation, therefore, should the tow-line part, the towed ship 2 will settle back, the tension block 50 will thereupon collide with the pulleys 12 and 14 while the carriage 52 collides with the foremast 7; pins 54, 72 and 73 will be broken, carriage 52 will be left suspended upon the stay 18 and the pulleys 12 and 14 will be carried by ropes 5^a and 5^b.

In Fig. 8 it is seen that the tension pulley 50 is carried clear of the bow of the towed ship; the ropes being under tension of the sea anchor. I have introduced another feature for the clearance of these lines which involves the use of another release hook 74 coupling the two parts of the sea anchor line 19 and 19^a together.

In Fig. 15, 75 is a flanged ring preventing the finger 21 from opening. This flanged ring is shown in Fig. 8 ready to collide with the pulley 55 on the mast 8 of the towed ship. A collision will cause this flanged ring 75 to be pushed toward the sea anchor; this will clear hook 74 and the rope 19 will thus be freed from the sea anchor. The endless rope 5^a and 5^b will then fall into the sea dragging with it only a portion of the sea anchor line 19. The tail-block will, therefore, be carried out a considerable distance over the sea before the knock-off-hook astern of the towed ship comes into collision with the main mast-head of the towed ship. Thus, when

the sea anchor line is detached, the loop and the tail-block will fall into the sea without any opportunity for its falling upon any portion of the towed ship where it might foul. The weight of the tail-block and mast-block will also cause the endless rope to settle in the sea and hold the endless rope approximately taut. This will prevent the endless rope coiling up and fouling with the screws of the towing ship. The endless rope can then be recovered on the deck of the towing ship without danger to anything.

In Fig. 3, it will be seen that I have omitted the use of a haul-down-block containing the wheels 15 and 15^a. The load, in this instance, is carried to the main mast of the towing ship where it is dropped to an auxiliary load carriage 76 running on the cable 77 and thus transferred to the deck amidship on the towing ship. The advantages of the haul-down-block 65 will be further set forth, as it forms a very important feature of my invention. The haul-down-block 65 has two wheels 15 and 15^a having a running engagement with the lower branch of the endless rope 5^b. To this block is attached the line 66 which may be shortened or lengthened in any suitable manner. In this way, the grade of the lower branch 5^b may be controlled. It will be evident that the speed with which the load 10 is transported along the endless rope will be somewhat affected by the direction of the wind during the operation of the apparatus; for if the ship is towing head-on to the wind, there will be a considerable resistance offered to the load 10 which will serve to slacken the speed. At other times, the wind may be in the opposite direction, which will increase the speed of the load 10. It is desirable, therefore, that there be some means for increasing or decreasing the grade of the lower branch of the endless rope 5^b. This is provided for in the haul-down-block 65 and the lengthening or shortening of the line 66.

In Fig. 2, I have shown another modification of my invention in which the winch 4 is located on the towed ship. It will, therefore, be evident that the means heretofore described for clearing the lines will not be available in this construction. 80 represents a small line attached to the mast 6 of the towing ship 1. It is led over a pulley 81 on the foremast 7 of the towed ship 2 and from thence to the tail-block 17. 79 is a small wheel having a running engagement with the line 80. The pulley 79 has a connection with the pulley 78 about which the endless rope bends at the mast 6 of the towed ship 1. In the event of breakage of the tow line, the pulley 78 is detached from the mast 6, and as the ship 2 settles back the weight of the block 78 will be carried by the pulley 79 along the line 80 until it is clear of the towed ship 1. A further settling back of the towed ship 2 would cause a break in the line 80, which is of very light construction. When the line 80 breaks, the pulley 78 and the endless rope will fall into the sea astern of the towing ship 1.

A further modification of my invention is shown in Fig. 16, in which the cable 19 instead of terminating at the tension carriage 17 terminates on the towing ship 1. Thus, the cable 19 forms an auxiliary support for the load carriage 9. In fact, the entire load may be carried on the cable 19 and simply propelled and controlled by the endless cable.

In Figs. 17 and 18, I show modifications of the tension carriage 17 in which it will be observed that the cable 19 is clamped or otherwise secured to the side of the frame 50. 82 is a clamp represented in the drawing as a strap secured by bolts 83 and 84 to the side of the tension carriage 17.

Figs. 19 and 20 show a side and end view of modifications of the load carriage. The lower branch 5^b of the endless cable is shown in the drawings as of reduced size, because the load may be supported on the cable 19 and, therefore, the endless rope will not be called upon to support its share of the load. 85 is a cam pivoted at 86 to the side frame 38 of the load carriage. If the line 5^b remains stationary and the load carriage travels in the direction of the arrow, the cam 85 will rest upon the upper portion of the line 5^b and the wheel 87 supporting the line 5^b will travel in the direction of the arrow. If, however, the load-carriage travels at a slower speed than the line 5^b, the cam 85 will be forced toward the rope and the wheel 87, the effect of which will be to arrest the wheel 87 from revolution and pinch the line 5^b in the V-groove, 88, of the wheel 87. This will cause the carriage to be drawn along with the branch 5^b of the endless rope and at the same speed at which the rope is traveling. I have shown the ratchet wheel 35 and the pawl 36 on the wheel 33 (Fig. 19) the object of which is the same as that shown in Fig. 6. It is evident that if the branch rope 5^b were caused to stop altogether, the cam 85 lifted and the branch 5^b lifted therefrom, it will be necessary that other means be provided for preventing the load from traveling down grade. This is provided for by the ratchet 35 on the upper wheel. 89 is a handle for lifting the cam 85 for the introduction or removal of the rope 5^b.

The haul-down-block shown in Fig. 16 is provided with a saddle 90 resting upon the cable 19 and two wheels 91 and 92, one above the other, below the lower branch 5^b of the endless cable.

In the construction of my invention shown in Fig. 16, the endless cable may be propelled at various rates of speed or stopped altogether, if desired. A load may be placed upon the cable and allowed to run down the grade of the catenary while the endless rope remains at rest. The endless rope may then be started and run at a higher rate of speed sufficient to complete the journeying of the load carriage when it may again come to a state of rest, permitting heavy loads to be discharged therefrom without shock or jar. During the time the load is ascending the upgrade of the catenary and while the load carriage is at rest, a further load may be journeying on the down grade of the cable. In this particular, I attain a great advantage, because it is very desirable in handling large loads that the load carriage come to a state of rest gradually before discharging.

Although I have described my invention as applicable to coaling war ships at sea, I do not wish to limit myself to such a use, for it is clear that there will be many opportunities for making use of my invention between any two supports. Neither do I wish to limit myself to the employment of an endless rope, because the suspended cable or trackway employed by me may be drawn longitudinally a short distance and then allowed to return. Each time the cable is being drawn inwardly, it may draw along with it a load, and the return thereof may be coincident with the travel of the load carriage by gravity.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a conveying apparatus, the combination of a movable cable and a load carriage, an engine for propelling the cable, said carriage being supported on a wheel and free to move along said cable in one direction, and restrained from movement in the opposite direction.

2. In a conveying apparatus, the combination of a movable cable and a load carriage; said carriage being supported on a wheel and free to move along said cable in one direction and restrained from movement in the opposite direction, the face of said wheel being provided with a groove fashioned so as to grip the cable.

3. In a conveying apparatus, the combination of a traveling cable, a load carriage free to move longitudinally with respect to said cable in one direction only.

4. In a conveying apparatus, the combination of a traveling cable and a load carriage free to move longitudinally with respect to said cable in the direction of the travel of the cable only.

5. In a conveying apparatus, the combination of a traveling cable and a load carriage, said carriage being supported on a wheel and free to move in one direction along said cable and restrained from movement in the opposite direction.

6. In a conveying apparatus, the combination of a traveling cable and a load carriage, said carriage being supported on a wheel and free to move in one direction and restrained from movement in the opposite direction, the face of the wheel being provided with a groove fashioned so as to grip the cable.

7. In a conveying apparatus, the combination of a traveling cable, a load carriage adapted to travel in the same direction as the movement of the cable at a higher rate of speed.

8. In a conveying apparatus, the combination of a traveling cable, a load carriage adapted to move longitudinally with respect to said cable in the direction of the motion of the cable, said carriage being provided with a grip whereby the said carriage may be propelled by said cable.

9. In a conveying device employing a suspended cable, the combination with said cable, of a load carriage free to travel by gravity longitudinally along said cable, means for preventing the backward movement of the carriage and means whereby said carriage is propelled on the up grade of said cable.

10. In a conveying apparatus, in combination, a suspended endless traveling cable, means for propelling said cable, a load carriage free to travel on the down grade of said cable and a grip whereby said load carriage is propelled by the cable on the up grade thereof.

11. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing-line, a cable-line, a tension device attached to the cable-line and means whereby when the distance between the vessels becomes abnormal and the cable-line is carried forward a prescribed distance, the tension of the tension-device is released.

12. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, an endless cable-line, a tension device attached to the endless cable line and means whereby when the distance between the vessels becomes abnormal and the endless cable-line is carried forward a prescribed distance, the tension of the tension-device is released.

13. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing-line, an endless and traveling cable line, a tension device attached to the endless and traveling cable-line and means whereby when the distance between the vessels becomes abnormal and the endless and traveling cable-line is carried forward a prescribed distance, the tension of the tension-device is released.

14. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing-line, a cable-line, a tension device attached to the cable-line and means whereby, when the distance between the vessels becomes abnormal and the loop of the cable-line is carried forward of the bow of the towed vessel a prescribed distance, the tension of the tension-device is released.

15. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing-line, a cable-line, a tension device attached to the cable-line and means whereby, when the distance between the vessels becomes abnormal and the cable-line, carrying with it the tail-block, is carried forward of the bow of the towed vessel, a prescribed distance, the tension of the tension device is released.

16. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, a cable-line extending to a tension device beyond an elevated support on the towed vessel and an automatically operated releasing device in said cable beyond said support, whereby when the distance between the vessels becomes abnormal the cable is automatically parted.

17. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, a cable-line extending to a tension device beyond an elevated support on the towed vessel, a carriage adapted to travel on said cable line, a hinged hook, a locking device having an unlocking projection and an abutment against which said projection may collide and thereby release the hook, said hook and locking device being located behind said support.

18. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, a cable-line extending to a tension device beyond an elevated support on the towed vessel, a carriage traveling on said cable line and comprising a wheeled portion and a hooked portion, a hook located on the cable beyond the support, a locking sleeve, an abutment against which said sleeve may collide and thereby release the last-mentioned hook.

19. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing-line, a cable-line extending to a tension device beyond the elevated support on the towed vessel, and a block attached to said elevated support and through which the cable line passes, such block being constructed and arranged to afford a slight resistance to strains applied horizontally in the direction of the cable-line, and a relatively considerable resistance to strains applied in other directions.

20. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, an endless cable, a tail-block, a carriage supporting said block, a tension device attached to said carriage, the connection between said tail-block and carriage being constructed and arranged to afford a slight resistance to strains applied horizontally in the direction of the cable-line and a relatively considerable resistance to strains applied in other directions.

21. In a conveying apparatus, the combination of a towing vessel, a towed vessel, a towing line, an endless traveling cable connecting said vessels, a haul-down-block having a running engagement with the lower line of said endless cable and means for vertically adjusting the position of said haul-down block to control the grade of said line.

22. In a conveying apparatus, the combination of a towing ship, a towed ship, a tow-line, a cable-line extending from the towing ship to and beyond an elevated support on said towed ship, a tension device attached to said cable-line, a load carriage on said cable-line, an elevating device consisting of a cable extending from the deck of one of said ships to an elevated support, an auxiliary load carriage traveling on said cable, a rope for raising said auxiliary load carriage and a drop-hook whereby said auxiliary load carriage may drop its load to the principal load carriage.

23. In a conveying apparatus, the combination of a cable, a load carriage free to move longitudinally with respect to said cable in one direction only, a stationary track at the receiving end of said cable adapted to receive the load and from which it is transferred to the cable.

24. In a conveying apparatus, the combination of a traveling cable, a load carriage free to move longitudinally with respect to said cable in one direction only, a stationary track at the receiving end of said traveling cable adapted to receive the load and from which it is transferred to the traveling cable.

25. In a conveying device, a towing ship, a towed ship, a tow line, an elevated cable over said ships, a load carriage free to travel by gravity a portion of the distance and supplementary mechanism for completing the journey of the load carriage.

26. The combination of a traveling cable, a load carriage adapted to travel along said cable at a higher rate of speed than the movement of such cable and means for automatically releasing a load from the carriage.

27. The combination of a towing boat, a towed boat, a cable extending between said boats, a carriage comprising a wheeled member and a hook connected thereto on said cable, an elevating truck for the load, means for imparting motion to the cable, means for releasing the load from the carriage, and means for hauling down said cable.

28. The combination of a traveling cable, a carriage free to travel by gravity along said cable, means whereby said carriage is propelled up grade on the cable, means for hauling down said cable, and means for releasing a load from the carriage.

29. The combination of a cable, a carriage free to travel by gravity along said cable, a portion of the distance of such cable and adapted to be positively propelled by the cable the remainder of the distance of its travel, means for preventing the backward travel of the carriage, means for hauling down said cable, and means for releasing the load from the carriage.

30. The combination of a suspended cable, supports for the same, means for propelling said cable, a carriage adapted to travel along said cable at a higher speed than the travel of the cable, and a haul-down device for said cable.

In witness whereof, I have hereunto signed by name in the presence of two subscribing witnesses.

THOMAS SPENCER MILLER.

Witnesses:
RICHARD W. SEABURY,
JOHN SINCLAIR.