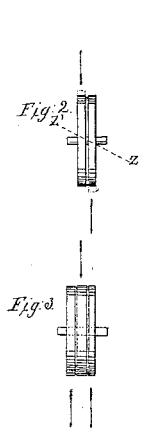
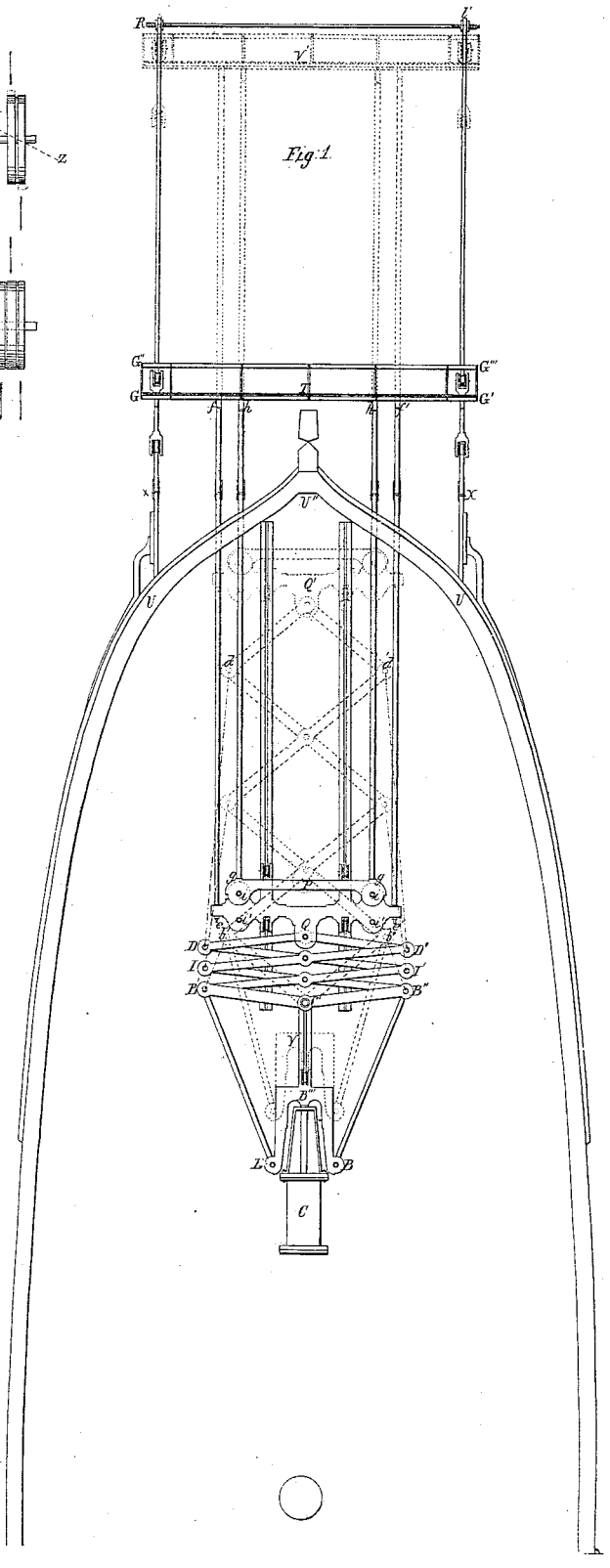
Sheet 1, 4 Sheets.

# G. H. Moureau.

## Ship Propeller.

No. 3,414. Patented Jan. 26, 1844.




Witnesses;

Inventor;

Sheet 1, 4 Sheets.

# G. H. Moureau

## Ship Propeller.

No. 3,414. Patented Jan. 20, 1844.

Fig. 2.

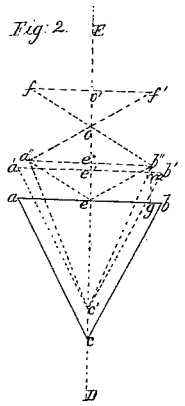
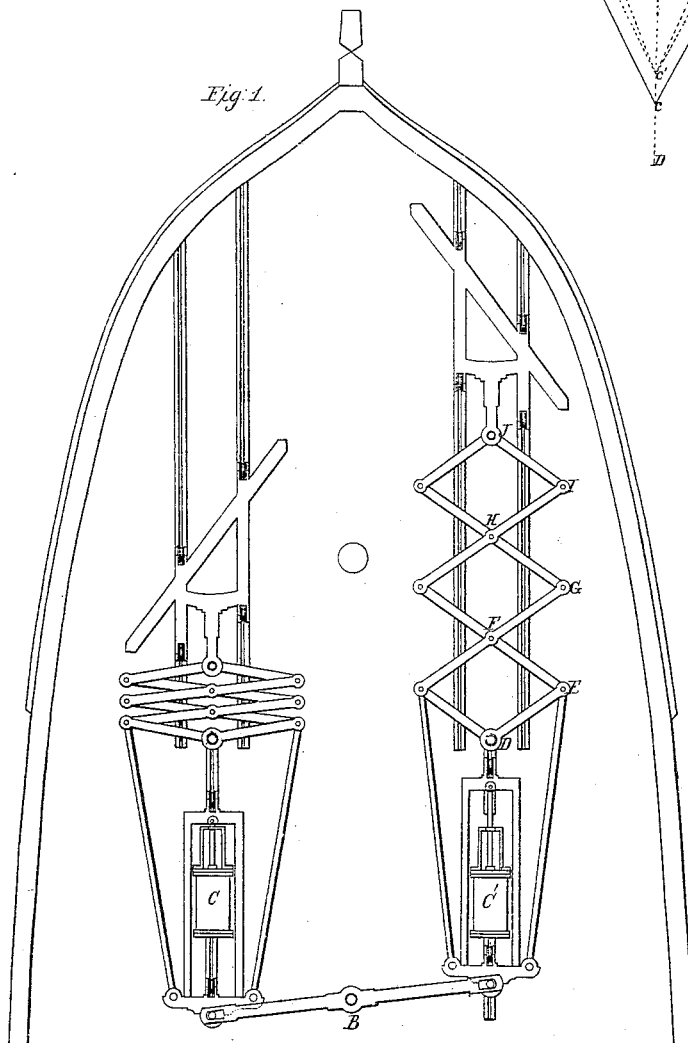



Fig. 1.




Witnesses;

Inventor;

H. Moureau

Sheet 3, 4 Sheets.

# G. H. Moureau.

## Ship Propeller.

No. 3,414. Patented Jan. 26, 1844.

Fig. 2.

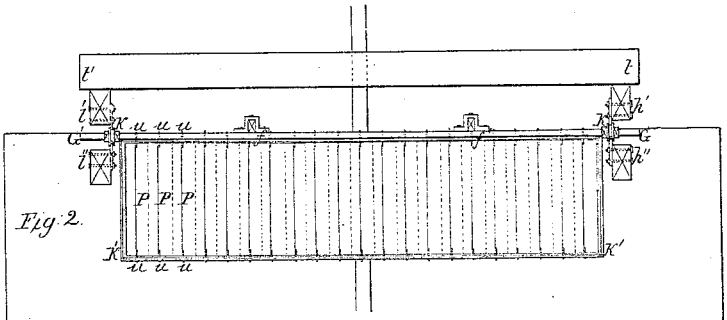



Fig. 1.

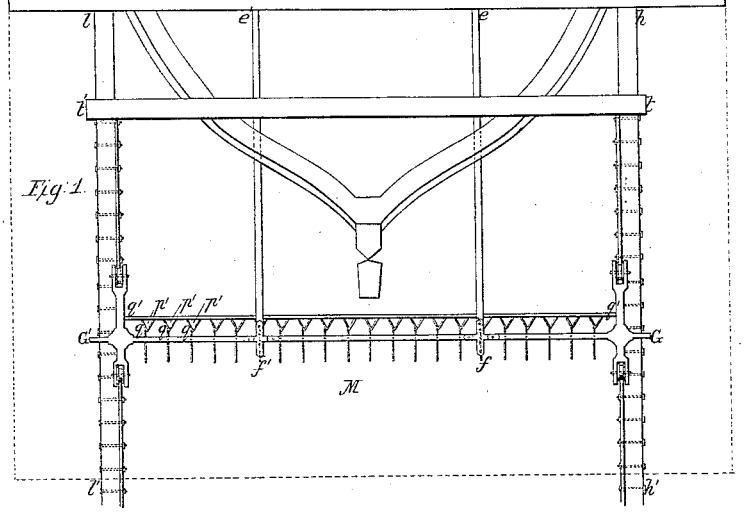
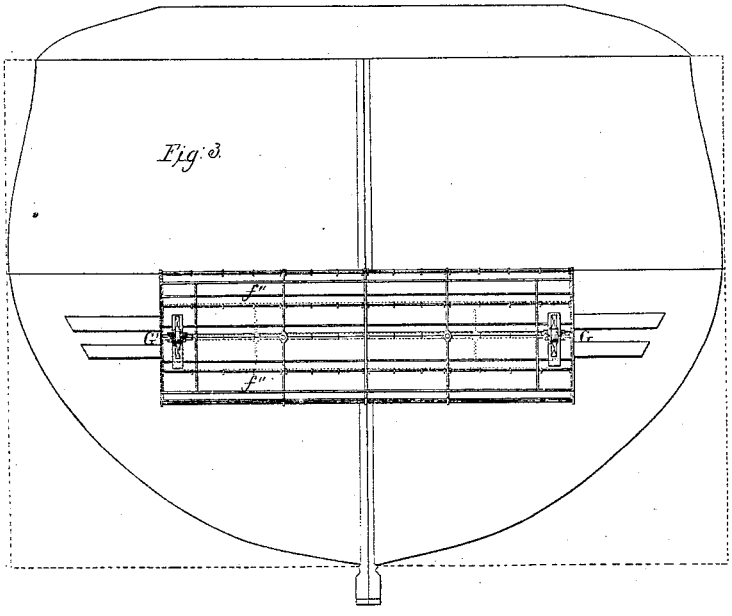



Fig. 3.



Witnesses;

D. Gallt Jr.

Inventor;

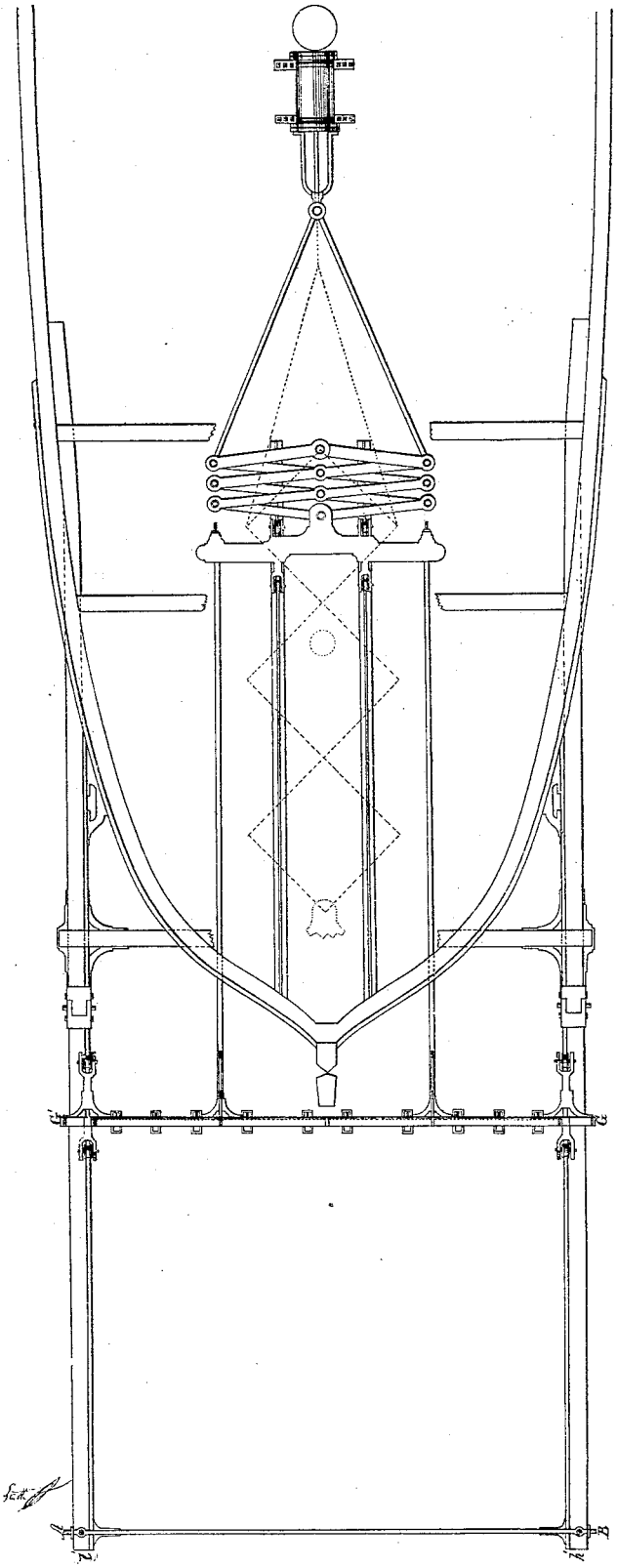
G. H. Moureau

Sheet 4. 4 Sheets.

# C. H. Maureau.

## Ship Propeller.

No. 3,414 Patented Jan. 20, 1844.



Witnesses;
2 sets.

Inventor;
C. H. Maureau

# UNITED STATES PATENT OFFICE.

GABRIEL HIPPOLYTE MOREAU, OF PARIS, FRANCE.

## IMPROVEMENT IN THE METHOD OF PROPELLING STEAM AND OTHER VESSELS.

Specification forming part of Letters Patent No. 3,414, dated January 26, 1844.

*To all whom it may concern:*

Be it known that I, GABRIEL HIPPOLYTE MOREAU, of the city of Paris, in the Kingdom of France, have invented a new and Improved Mode of Direct Mover Applied to the Navigation by Steam; and I do hereby declare that the following is a full and exact description thereof.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure 1, Plate 1, presents the plan of the apparatus. This apparatus is placed in the hold of the vessel, except the pallet or propeller destined to act on the water with its accessories. It is outside in the hind part. As to the ship being not the object of the description, one sees but the outline U U U U U′ U″ being the keel, figurated here from the mainmast to the fore part of the rudder. It is agreed I have nothing to prescribe relating its form. The apparatus will indicate well enough the dispositions that the hold must present to receive it.

C is the horizontal cylinder of the steam-engine. Its axis must be a little above and more often below the plan of the floating, according to the various cases I will further indicate, parallel to the keel and exactly above.

B B′ B B″ are two connecting-rods attached to the piece which is seen in B‴, up the head of the piston-rod and movable on the iron pins B B. The extremities B′ B″ of the connecting-rods are attached in the same way to the two ends, the nearest of the system of levers B′ B″, D D resembling what is called a "zigzag," and which is seen in certain playthings to set in motion soldiers, &c., by unfolding and folding again the system.

For the future I will call "bar" each of the levers B″ I B′ I′, &c., which compose the system in question.

C′ is the chief bolt, fixed upon one of the keelsons or railway and other pieces which will be used to support the apparatus and give solidity to the bottom of the ship. That strong bolt serves as an axle or leaning point, on which move the bars B′ I′ B″ I, which cross in C′.

Q is a frame attached by the same pin which unites the extremities of the bars D Q D′ Q. At this same frame-crossing Q are fixed the ends *e e* of the rods *e f e f*, which are prolonged without at the hind part, crossing the scutcheon by tow-boxes, which prevent the introduction of the water into the ship. This frame is carried and rolls on rollers to soften the friction on the railways.

G G′, Fig. 1, Plate 2, is a traverse or shaft, to which are bolted the two other ends *f f′* of the rods *e f e f′*. This shaft G G′ is terminated in a T at each of its ends, which slide between the sleepers *h h′ l l′*, so that to let them be seen the upper sleepers are supposed to be taken off. Each extremity of these ends in the form of T is furnished, as we see, with a grooved roller working between flat iron bands fixed to the internal borders of the sleepers we have just spoken of and maintaining the position of the shaft.

*t t′* is a piece of timber crossing the hole, and which can be accompanied of many others according to the wants to maintain and consolidate the sleepers *h h* and *l l*. It is useless to say these sleepers can be more or less near and consequently enter into the ship or find themselves externally on the sides. It is needless, too, to indicate they must be perfectly consolidated and fix invariably their distance.

Plate 3 presents the whole of the sleepers with the cross-piece or traverses which make it tight, and the bar A B, which at the outside extremity of the sleepers assure the perfect parallelism.

I will show just now (Plate 2, Figs. 1 and 2) how the pallet having its plan vertical is attached to the shaft G G and which are its conditions and play. Till then let us consider but the shaft G G without the accessories.

I have figured in the steam-engine but the cylinder C, without the accessories and other parts of those sorts of engines, since they are perfectly known. I will further indicate some new conditions favorable to the employment in question.

For greater easiness and before any other complication of ideas, let us now consider the mode of action of that apparatus. In Plate 1, Fig. 1, the steam arriving under the piston the end of the rod-maker works the piece B‴ toward V. By this movement the connecting-rods B B′ B B″ push the ends B′ B″ of the bars C B′ C B″, and the main bolt C being fixed the system B′ B″ D D′ is unfolded, as is indicated by the dotted lines, so that when B is in V the points B′ B″ D D′ of the

system have followed the movement and are in $b'$ $b''$ $d$ $d'$. It is obvious, besides, that by this unfolding the piece Q, working alone, (see it now in Q',) the rods which are fixed to it and which bear at their extremities exterior the transversal shaft G G' cause that shaft to work parallel with itself, and also the pallet itself which is attached to it, as we shall see, and which being in a vertical position strikes the water in the hind part. Thus the ship is solicited to work forward.

Let us pass to the pallet, Plate 2, Figs. 1 and 2. As I have said, it is attached to the shaft G G'. Its surface on the side M—that is to say, that surface which is to strike the water—is seen in Fig. 2, which shows the pallet in elevation. $h'$ $h''$ $l'$ $l''$ are the ends of the sleepers, between which on each side are seen the dovetailed brackets of which I have just spoken. G G' is the shaft. It forms the upper side of a frame K K K' K'. This frame is filled with a certain number of doors or shutters P P P, turning on the hinges or pivots $u$ $u$ $u$. It can be consolidated by some buttress going to the rods or to the branches which bear the dovetailed brackets. In $f$ $f'$ are square ends or other forms of the rods $e$ $f$ $e'$ $f'$ of Fig. 1, fixed on the shaft by means of plates and bolts or strong screws, or otherwise. Let us understand these doors without stopping—that is to say, being able to open indistinctly within or without. If they are barred on the side of the boat, so as not being permitted to open on that side, the apparatus unfolding they will strike the water and will remain closed by its resistance. It must be so, indeed, to have the boat going forward. On the contrary, the apparatus folding again by the opposite course of the piston and bringing back the frame of the shutters, these last will be immediately opened by the resistance of the water in a contrary sense, and the surface of resistance is then limited to the thickness of the shutters and of the frame. This surface is insignificant, the frame being always iron and the shutters in brass of two or three millimeters thick, or about the sixth part of an inch. Each shutter should be allowed twenty or twenty-five centimeters only width, or about eight or nine inches. The larger they should be the greater space they should have to run to shut, and that should be as much loss for the course. It is convenient to take the precaution to have them shut more or less before the end of their returning course, near the ship for that purpose. The shutters stretch backward beyond their pivots, as is seen in $g$ $g$ $g$, when they arrive near the end of the course near the ship. These prolongings of the shutters meet in the convenient sense. The obstacles P' P' P', which present them, are inclined surfaces, so that the shutters are forced to turn on their pivots and to shut to a certain point. The apparatus unfolding anew, the resistance of the water terminates immediately their shutting. The obstacles P' P' P can be placed on a cross-piece $g'$ $g'$, the two ends of which will be fixed on the sleepers. To work backward, this bar should embarrass, because the shutters should meet it too soon. Being open on that side, it must then be movable. Two or three transversal bars will prevent the shutters, as I have said, to open on the side of the ship. The necessary cuts will be made on the projecting parts $g$ $g$ $g$ of the shutters for the placing of the bars. One has very seldom to work backward. However, one must conceive that it should be sufficient to bar the shutters on the opposite side, for then they would strike the water in contrary sense during the refolding of the apparatus. There will be intermittence, as is understood, in the action of the pallet, for the piston's course in one sense makes it act in unfolding the apparatus. In the other sense the course will only bring it back by refolding the same apparatus. Then to bring it back when empty, it is evident a small part of the force is sufficient. The engine might then be to simple effect and high pressure.

By means of the condenser the single atmospheric pressure should refold the apparatus, and thus procure an economy of about a half. One could also dispense even condenser, and working to simple effect trust to a flier the empty course. At length, one may use the detent of the steam, introducing only the necessary quantity for so weak an effect.

I have just spoken of the empty course, and I will stop on a very important observation on this account. It is that at the end of this empty course or return there should be an enormous shock, should nothing be disposed to prevent it. In fact, a considerable mass, animated with a great velocity, could not be stopped instantly without a very violent shock. Such an inconvenience must then be avoided. The surest means is to have the returning course operated slowly; but it is not only sufficient for that to open very little the cock of introduction of the steam into the cylinder, for the active course should resent it, and in that course the velocity is to be limited only by the resistance of the water to the pallet. I then open pretty much the ordinary introducing-cock, but I put a second cock between the regulating-drawers and the end of the cylinder where steam must come in to operate the returning course, so that to come to it the steam is forced to pass through this second cock. I open it very little and diminish at will the returning course by this means without influence on the active course. The relenting which is mentioned, by means of the cock I have added, is necessary not only to prevent the shock, but still to diminish the resistance of the water. In fact, though the striking-surface in the return be very little, the pieces presenting their edge side, the resistance should still be considerable enough if the quickness was not insignificant. It is easy to conceive that to be able to work backward with the same advantage it should be necessary to establish two

cocks, one between each end of the cylinder and its drawers. One should open the one entirely and the other as little as should be necessary, according to the want of working either forward or backward. To prevent the effect of what the system would still have of acquired velocity at the end of the returning course, one may place flat springs that the ends I I′ come to strike. These flat springs have by trying a greater course than that which the shock can furnish them and cannot then be broken by it.

Learned mechanicians think that intermittence in the action of the force for the shock is advantageous, and they found themselves upon its being admitted by nature for all the swimming animals. However, we shall observe that intermittence can be avoided, if one prefers it. It is sufficient to cast one's eyes on Fig. 1 of Plate 4 to get convicted that there is but to double the system. By means of a common beam B two cylinders C C′ will alternately put two or more pallets in motion. The steam will never go but on one side of the piston in each cylinder, and for the contrary course a piston will bring back the other—that is to say, that which unfolds an apparatus refolds the other in the meantime. One will easily understand that a single cylinder working in double effect can also make alternately act the two systems by easy modifications in the accessories. The shaft G G′, Plates 1, 2, and 3, Fig. 1, can be prolonged to the two ends without the sleepers. Other pallets can be adapted to it by prolonging of the plane of that which is between the sleepers. It is evident that one can also establish one or several pallets lateral to the ship connected with the system of the others by rods, which will tie them to the prolonging of the shaft G G′. Sleepers or keelsons will also guide these lateral and posterior pallets. In short, the shaft G G′ prolonged cranked, modified according to the want, furnishes the means to work pallets striking the water by a surface, as it were, as extended as can be wished. The crank in dividing the pallets presents the advantage of dividing the surge without losing anything of the pushed surface.

Relating to the pallet, I must still observe they can be of many kinds. For instance, the number of the small shutters can be diminished. It is sufficient for that to give them more extent in length and to articulate them to their upper edge, or to the two ends, or to their lower edge. During the useful course the shutter remains close, and in the returning course it opens and takes a horizontal or vertical position, as the case may be, by the resistance of the water. It is good, however, that a light spring or weight brings it back and maintains it in this position till about the end of the returning course. An obstacle analogous to P′ P′ P′ of Fig. 1, Plate 2, obliges it to lower and close in great part, the resistance of the water ending quickly to shut it as soon as the useful course begins again. One can put a shutter above and one under the shaft, and even multiply them enough that they have each a small width, as is seen at *f″ f″ f″*, Fig. 3, Plate 2, and Fig. 2, Plate 5. When it is only question of some centimeters of draft, the cylinder, the system of levers, and the rods shall be disposed in such a way that the shaft G G′, Plate 2, Figs. 1 and 2, finds itself in the height of the floating line and then the pallet is entirely below the shaft. In the different cases it is convenient to make, so that the shaft G G′ is immersed at a depth of half the height which will be given to the pallet, so as to have a same number of shutters above and below this shaft-plate 2, Fig. 3, Plate 5, Fig. 2. It is in order that the resulting of the resistance of the water be in the same plan of the shaft and of the rods which tie it to the system of levers. Without this precaution the friction would be enormous to the dovetailed brackets which roll on the sleepers, the resistance aiming to make them basculate if it took place but under or above the shaft G G′.

I have above given the description of the wooden sleepers. Plate 1, Fig. 1, represents iron sleepers, which can be substituted for wood sleepers, if one likes it better. They are connected and made solid among such other by the iron bar R S, which maintains this invariable distance. The upper sleeper is supposed to be taken off to exhibit the under one with the brackets. Fig. 3 of Plate 2 shows them in profile. The brackets roll on these sleepers. Joints may also be disposed in X X to raise up the whole system backward against the hind plate.

The pallet-plate 2, Fig. 3, is composed of a quantity of shutters, which can be increased or diminished both as to number and dimension. These shutters articulate on a joint at their upper edge in the vertical bars of the pallet, and are free to move on each side of the frame which contains them. This condition is essential for propelling forward and backward.

Fig. 1, Plate 1, presents the system ready to set the ship in motion forward. For this purpose there is a double frame G G′ and G″ G‴, with vertical rods in each, so disposed as to correspond with the outer edges of the shutters of the pallet, which is between the two frames, connected and maintained in their position vertical and parallel to the said pallet by horizontal cross-pieces. These cross-pieces always preserve the distance of each frame a little more than the width of one of the shutters of the pallet.

In the drawings, the face G G′ of the double frame is against the pallet. Parallel to the rods *e′ f′ e f* are two other rods connected at their end *g g* by a piece of iron P, placed on the frame Q and attached to the double frame by their other end *h h*. It is seen that by maintaining the position of the pieces as Fig. 1 presents them the pallet meeting the

obstacles on the side of the ship will strike the water from T to V and will push the ship forward. For the contrary effect, it is sufficient to slide the piece P backward to Q, equal to the width between the frames. By shifting the iron bar P from *i i* to *i' i'* the frame G'' G''' will be brought against the pallet, which prevents the shutters from opening when the pallet toward the stern of the vessel, thus propelling the vessel backward. The rods *g h g h*, which serve as guides to the double frame, pass through tow-boxes and will have, like those which hold the pallet, joints which will permit them to lift up with the sleepers.

In Plate 3, Fig. 1, and Plate 5, Fig. 2, one sees a pallet of another kind. It is formed of a frame containing shutters allowed to go either forward or backward, as it has already been described; but for this pallet it is sufficient to place the obstacles or bars, Figs. 3, 4, and 5 of Plate 5, toward the stem of the ship to propel forward, or on the other side to propel backward. These obstacles or bars slide easily up and down in the cramp-iron or staples *v v* for that purpose in the cross-pieces of the frame. Fig. 1 of Plate 5 presents the same pallet in plan with the same obstacles, but divided into three parts on its width. By this means one finds the advantage of shortening the sleepers of all the parts thrown backward and to bring nearer the ship the moment of departure of the pallet. For each of the above systems two keelsons having iron rails are placed as much to consolidate the bottom of the ship or boat as to receive the rails on which the system of levers slide in unfolding and refolding, and also to receive the brackets of the frame. A brace above the system will equally be necessary to prevent its bending in raising by the effort and resistance. The bolts that articulate the system should be very cylindrical and polished in order to make the function of brackets. The head will be above and a key under will maintain them. The section of the upper end will bear a little cavity, in which there will be poured oil, which from thence will spread, sliding along the bolt and will lubricate the articulation. There will be brass disks between the bars of the system to their articulations, the bolts passing through these disks. These disks are easy to supply. They soften the rubbing, and prevent the contact of the bars. Their lasting is, as it were, endless, since the force acts not at all in the sense of their rubbing. The holes of the bars will be supplied with brass rings for the same object. Let us say the same about the holes receiving the axis or pivots of the shutters of the pallet. These rings are made of ends of tubes, which cost almost nothing and can easily be supplied, since they are introduced only by rubbing and without rivet. Besides, it is easy to understand that in that apparatus the rubbings are reduced to very little, though one is inclined to judge otherwise at first sight. In fact, the rubbing of the articulating-bolts with the bars does not go to two centimeters of running per second. The passage of the rods through the tow-boxes is made by soft rubbing and tows well greased. The rubbing of the brackets on the iron bands fixed to the sleepers, keelsons, or railway seems to present a great importance on account of the velocity of several meters a second; but one must consider that the rubbing of the brackets must not be assimilated to that of a piece of metal sliding on another. With brackets the metals can neither adhere nor tear each other. Still more, here the things happen in the water, and the small quantity of liquid which is forced between the brackets and the band on which it rolls prevents to a certain point their contact. Water would but favor their adherence and tearing in another sort of rubbing, but here it is a body the various points of which are successively superposed to those of another, and which, properly speaking, do not slide.

In the system of levers which presents Fig. 1, Plate 1, there are two crossings of bars or levers and two half-crossings. One sees two bars for each, but one must conceive three, so there is one exactly parallel to B' I' below, and that the plan won't let see, so that the bar B'' I' is between B' I' and that marked by B' I'. If there were but two bars for each crossing, the forces acting in contrary sense, as indicates the arrows, Fig. 2, the bolt would be forced to take the position Z Z'. On the contrary, when there are three bars, two of which are moved in one sense and that of the middle in the other, Fig. 3, nothing like can take place. By the same motive the ends of the connecting-rods B B' and B B'' are articulated between the bars C' B and C' B'', which are seen, and those placed parallel under them and which cannot be seen in plan. The ends of the bars B'' I, I' D, and D' Q are also between the two bars superposed B' I', I D, and D Q. It is understood that a movable floor by parts will cover the whole system till the tow-boxes fixed to the scutcheon and which give way to the rods. The thickness of that system being very small, it takes but very little place in the ship. It passes under the mizzen-mast in the ships with sails and does not go so far as the mainmast. As the system has nothing frail, there shall be rarely need to raise some parts of the flooring to reach it and make reparation. Even the boilers and their accessories may be placed above this flooring. Therefore, if one prefer it, they will be upon bearings which do not prevent even the opening of the flooring in need.

I do not believe it necessary to enter into long details to show the superior advantages of my system by comparing it with the paddle-wheels. Plenty books have already been written on the inconvenience of these wheels. It is generally admitted that the transformation of the rectilinear into rotative costs the half of the force spent without any profit.

My system does not at all give occasion to that transformation. One cannot do better than to act immediately in the very direction of the piston. The obliquity of the paddle is considered as another cause of considerable loss of force. My pallet is vertical and strikes the water in working horizontal, and always parallel to itself it is impossible to avoid more completely any obliquity. Everybody agrees that the extend of the paddles is naturally too small; that the greater should be the surface which is to strike the water the greater advantage there should be. In my system nothing limitates that surface but the depth of the water and the width of the river, as it were, if one is on the river. It is not possible to be more at ease on that score. The enormous bulk of the wheels, with their paddle-boxes on both sides of a ship, presents the gravest inconveniences. Here are the principal embarrassments—resistance offered to the wind, obstacle to the arming and stowing, difficulty in pointing the guns according to the want, necessity of giving small width to the ship, &c. With my system the sides of the ship are perfectly free. She can be rigged as usual, use sails, &c. The external part of the apparatus is at the hind part and can rigorously be wholly immersed. These remarks, to which I stick, can also furnish points of comparison with the other systems which have been tried to supply the paddle-wheels. I have no right here to speak about it. One shall observe that it has not been sufficient to apply the zigzag to the use in question. It was still necessary to improve it, and among the rest by putting three bars to the levers for each crossing. There is by my system without catchings neither rotative nor circular movement, neither in the whole, as by wheels and by the Archimedean screw, nor in parts, as by the vertical or horizontal oars, by the apparatus palmipeds, by the pallets moved by means of endless ropes or chains.

Being to neglect nothing of what contributes to a perfect knowledge of the system which is the object of this memoir, I will add some theoretical remarks to what I said about it. We shall call D E a half-crossing, as E F, F G, H I, and I J, Plate 4, Fig. 1. It is sufficient to examine the system to understand that the course of the pallet shall be equal to as many piston course as there are two crossings on one side or the other of the zigzag. There are six in the actual case, and thus the course of the pallet is equal to six times the course of the piston. It is nevertheless but an approximation. In fact, let it be a triangle isosceles, Plate 4, Fig. 2, $a\ b\ c$, whose base is $a\ b$, and let it be a line D E passing by the top and by the middle of the base. If we bear $c$ in $c'$ and the base $a\ b$ in $a'\ b'$, so that the line D E be in the same conditions for the triangle $c'\ a'\ b'$, it is obvious that the distance $e\ e'$ equals $c\ c'$, but if $a\ b$, instead of being rigid, is broken in $e$, or what comes to the same, if $e\ a$ and $e\ b$ articulate in $e$ on a same fixed main pin, as the point $e$ will not be able to move when we bring $c$ in $c'$, $e\ a$ will take the position $e\ a''$ and $e\ b$ the position $e\ b''$, then the distance $e\ e'' > e\ e'$. In this case, therefore, if $c\ c'$ represent the piston course, the pallet having gone from the line $a\ b$ on the line $a''\ b''$, shall have run the distance $e\ e'' > e\ e'$, or greater than the piston course $c\ c$. The difference is $e'\ e\ e''$ or $b''$, in which is the difference between the piston course and the sine $b''\ g$ of the angle $b''\ e\ g$. One may then say, also, that the course of the pallet in this case is equal to the sine $b''\ g$ of the angle $b''\ e\ g$. Not to lose sight of the piston course, we shall say that that course being I, and designing $b''\ m$ by $d$, we shall have here for the course $c$ of the pallet $c = \mathrm{I} + \frac{1}{d}$. In the continuation of the zigzag, if we add a crossing of bar to what we have just considered, during the same piston-course these bars will take the position $a''\ f'$ and $b''\ f$, and the pallet, supposed at first in $a\ b$, with the whole system will find itself on the line $f\ f'$. Then the distance $e''\ o'$ is evidently double of $e\ e''$. The pallet will then have run a distance equal to three times $e\ e''$—that is, equal to three times what it had run in the preceding case, and the formula $c = \mathrm{I} + \frac{1}{d}$ will become here $c = 3 + \frac{2}{d}$. It is to say that the course of the pallet is equal to as many times the piston course as there are halves of crossings of bars on the one or the other side of the zigzag more as many times $\frac{1}{d}$. In general, let it be $n$, the number of the halves of crossings on one side, and $d$ expressing always $b''\ m$ when the piston course is 1. We shall have $c = n + \frac{n}{d'}$ value of the course of the pallet in course of the piston, or, otherwise, $c = n \sin e$, $e$ indicating the angle $b\ e\ b''$. If one changed the disposition of the system so as to unfold it by drawing and not by pushing, one should change the sign, and we should have $c = n - \frac{n}{d}$.

As to the force, let it be F equal force of the engine or of the piston; $l$, piston course or its velocity; $c$, pallet course or velocity; $f$, force to the pallet. We shall have $f = \frac{\mathrm{F}}{c}$, since the force is reciprocal to the velocity.

I think I must forward an observation which could be made at first sight on the momentums of the levers. Those momentums vary; but the variation takes place as well on the side of resistance as on the side of power, and in general they are even more favorable to this last one, as can be proved by an attentive examination I need not demonstrate here. To have neither to work in water nor to retire the pallet, the shaft and the accessions in want, one may adjust the parts of the sleepers, which pass at the hind part, joining

them with the parts which are either lateral and exterior to the ship or internal. One can even fix a strong joint to the junctions of the upper sleepers, so as to have only to rise up the ends $h'$ $l'$ of the sleepers to have soon the pallet above the water. Nothing is more easy than consolidating the junction, so as to make the upper and lower sleepers solid.

In the present memoir we had not to busy ourselves about the moving force of the system or apparatus said direct mover. We shall only say that steam, as all other movers applied till this day and those which may be discovered for the future, can be used with success and without any inconvenience.

Having thus stated the nature of the invention and the manner of making and using the same, I would have it understood that I do not claim propelling vessels by means of reciprocating paddles; but

What I do claim, and desire to secure by Letters Patent, is--

1. The method herein described of causing the paddles at the end of the return-stroke to assume a position inclined to the plane of their motion, so that on starting the resistance of the water shall close them by the combination of the paddles or shutters $q$ $q$ $q$, with the obstacles or inclined surfaces $p'$ $p'$ $p'$, for the purpose and in the manner described, whether the paddles or shutters be attached to vertical or horizontal axles.

2. The shifting of the bar against which the shutters or paddles fold, so that the paddles can be made to act in backing the vessel when desired, as herein described.

G. H. MOREAU.

Witnesses:

D. LATTE,

EW. TUPPER NORVILLE.