(No Model.) 2 Sheets—Sheet 1.

J. & J. H. BANKS & W. B. PEET.

OARSMAN'S RECORDER.

No. 478,270. Patented July 5, 1892.

Fig. 1.

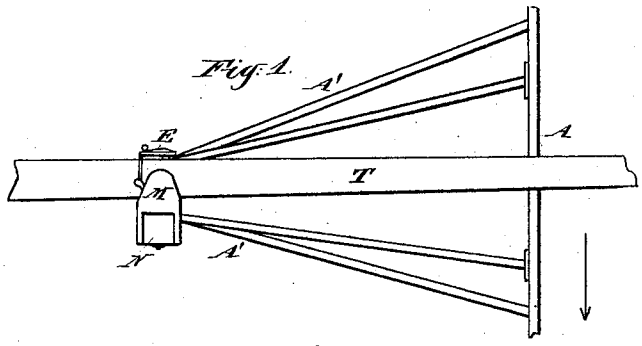


Fig. 3.

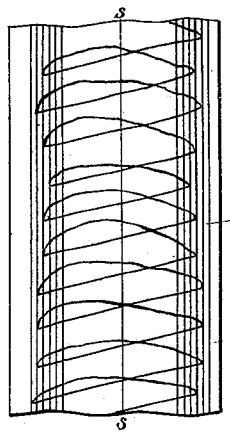
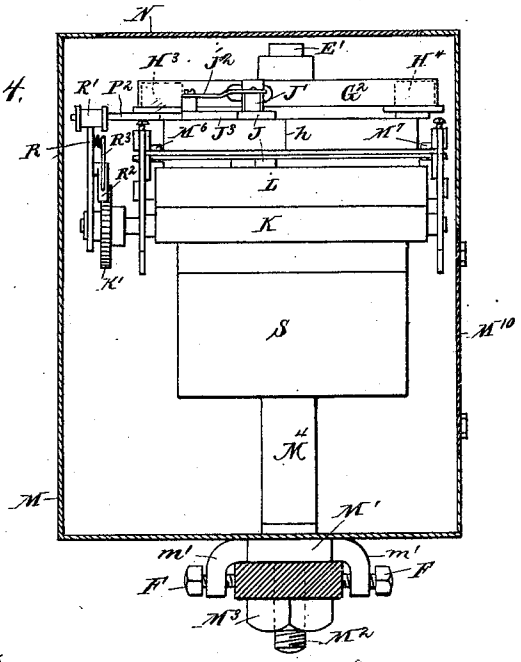


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

J. & J. H. BANKS & W. B. PEET.

OARSMAN'S RECORDER.

No. 478,270. Patented July 5, 1892.

Fig. 2.

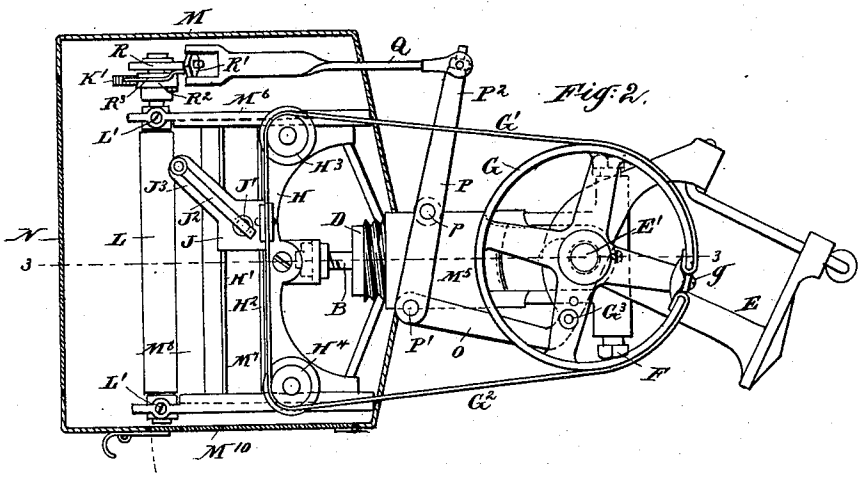


Fig. 3.

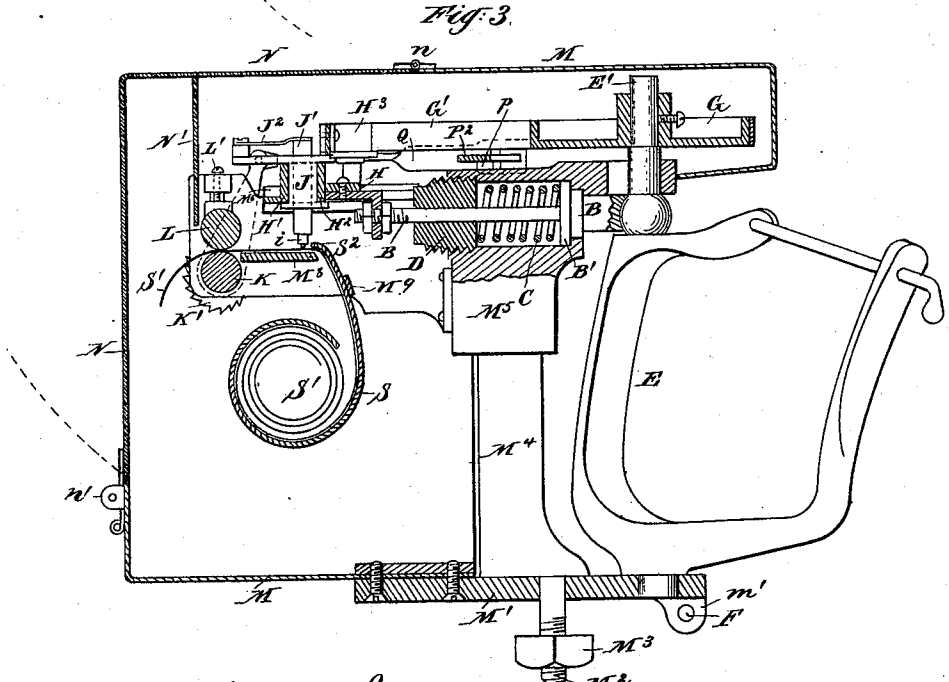
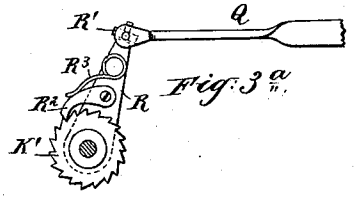


Fig. 3a.



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OARSMAN'S RECORDER.

SPECIFICATION forming part of Letters Patent No. 478,270, dated July 5, 1892.

Application filed May 2, 1891. Serial No. 391,333. (No model.)

To all whom it may concern:

Be it known that we, JOHN BANKS, JOSEPH H. BANKS and WALTER B. PEET, citizens of the United States, residing in the city and county of New York, in the State of New York, have invented a certain new and useful Improvement in Oarsmen's Recorders, of which the following is a specification.

We have devised a compact arrangement of the recording mechanism, allowing the whole to be inclosed in a case of small capacity, which may be conveniently mounted in the ordinary position of the rowlock. Our recorder may serve on the gunwale of ordinary row-boats or on the outriggers of sporting boats and shells.

We will describe it as applied in the latter situation. It requires a different arrangement for the starboard side from the port side of the boat. A single recorder may be used alternately by the different members of a crew, changing its position from one rower's place to another on the same side of the boat, or there may be as many recorders employed as there are men in a crew. The preferable mode of using will be to have as many recorders as there are oars and using one for each rower, carefully adjusting the tension of the springs, so that all will be as nearly as may be alike, and then further eliminating the accidental differences by interchanging the instruments, setting them in different places. A description of one will suffice for all.

We provide for conveniently inserting and holding the paper in a long strip rolled up. It is fed forward between two rollers, which are turned during the recover movement of the oar sufficiently to allow the lines traced across and back by the pencil to be easily distinguished one stroke from another and, if necessary, to be carefully studied and measured. We shield the paper as it emerges from the rolls, so that it is certain to be deposited and accumulated in the space provided. The pencil is traversed across by a band motion actuated by the horizontal sweep of the oar, using in what we esteem the most complete form of the invention two bands or two parts of a band so arranged that the motion of the pencil in each direction is positive. A helical spring is conveniently housed and equipped with a screw-threaded plug, by turning which its tension may be adjusted. The motion is derived from the upper portion of the rowlock, thereby holding the mechanism at such a level as to greatly reduce the chances of dipping into or splashing with water.

The accompanying drawings form a part of this specification and represent what we consider the best means of carrying out the invention.

Figure 1 is a plan view of the recorder and the adjacent portion of the boat and oar. The remaining figures are on a larger scale and show the recorder alone. Fig. 2 is a plan view showing the main portion of the recorder. Fig. 3 is a central vertical section partly in elevation. The section is on the line 3 3 in Fig. 2. Fig. 3^a is an elevation of a portion partly in vertical section. Fig. 4 is an end elevation of the mechanism seen from the front. Fig. 5 is a face view of a strip of paper after its removal from the recorder.

The same letters of reference indicate the same or corresponding parts in all the figures where they appear.

A is a portion of the boat, and A′ A′ the outrigger thereon.

M is the casing of our recording device. It is applied to the outrigger A′ and removed at will, being secured by means of a bottom plate M′, bolt M^2, and nut M^3. (See Fig. 3.) The bolt M^2 is set in one of the holes usually provided in the outrigger for the ordinary rowlock. At the after end of the plate M′ are ears m', extending down at the edges of the outrigger and carrying screws F F, which when the device is in use are screwed up to take a firm hold of the edge of the outrigger and prevent any shaking.

M^4 is a stout post extending upward from the bolt M^2. In its upper end is a cylindrical chamber receiving the slide B, which is formed with a collar B′, adapted to receive the force of a stout helical spring C. The other end of this spring abuts against a screw-plug D, which is tapped into the forward end of the chamber and is traversed by the small end of the slide B. This spring is the force against which the rower exerts his strength in pulling the oar, and its yielding to a greater or less extent indicates the force of the pull at

any given point in the stroke. By turning the screw-plug D the tension of this spring may be adjusted.

E is a rowlock constructed in all respects in the usual form, except that the upper pivot E′ is extended upward farther through an arm cast integral with the piece M^5. This arm embraces the upper pivot E′ of the rowlock, holding it in a slot in which it may play freely forward and backward, the slotted arm serving simply as a guide laterally. The effective bearing of the pivot E′ is formed in the after end of the slide B. These parts are finished spheroidal, so that the rowlock may not only turn easily with the sweep of the oar, but may also rock to a considerable extent forward and backward, as will appear farther on.

The extended pivot E′ has rigidly set on its upper end a horizontal wheel G, which serves by means of a flexible strap $G' G^2$, running around pulleys H^3 H^4, to impart the required forward and backward traversing motion to a carriage J, which carries the pencil *i*. This carriage J traverses across between parallel ways $H' H^2$, which are fixed on a carriage H to a central point, in which carriage H is firmly attached the slide B. The arrangement insures that the entire carriage H, with its ways $H' H^2$, is traversed forward and backward in the fixed ways M^6 M^7, being urged forward by the variable force impressed by the oar T, acting in the interior of the rowlock E, and being urged in the opposite direction by the tension of the spring C. The pivot E′ and the wheel G carried thereon move forward and backward to about the same extent as the slide B, the only difference being that due to the slight change in the upright position of the rowlock as the strain received through the oar is alternately impressed and relaxed. The wheel G and its flexible strap $G' G^2$ move forward and backward bodily to the same extent as the carriage H and pulleys H^3 H^4. The tension of the strap $G' G^2$ and the position of the carriage J induced thereby in its motion transversely to the instrument are not affected by the change of position due to the contraction and expansion of the spring C.

G^3 is a pin set adjustably in the lower face of the wheel G. It serves as a pivot for a horizontal link O, which is connected by a pivot P′ to one end of a horizontal lever P, which turns on a center *p*, carried on the piece M^5, fixed on the post M^4. The other end of this lever P (the outer end P^2) is pivoted loosely to a link Q, which extends forward nearly horizontally and is pivoted to a swivel R′, carried on the upper end of a lever R, which is centered on the extended axis *k* of the lower feed-roll K. A pawl R^2, pivoted on this lever and subject to the action of a spring R^3, engages with a ratchet-wheel K′, fixed on this axis *k*, and at each rearward movement of the link Q the lower feed-roll K is partially revolved by the pawl. The upper feed-roll L, being gently pressed thereon by adjustable screws L^4, is turned by friction and the paper is fed forward intermittingly by the action of these feed-rolls.

M^8 is a table fixed in the interior of the case M about on a level with the line of junction of the feed-rolls K and L. The paper is carried over this table and receives in passing a mark from the pencil *i*, which is carried in the carriage J, which latter is bored vertically and smoothly and receives a tube J′, the exterior of which is finished to fit easily in the interior of the bore. A pencil *i* is set tightly in the tube J′. The rising and sinking of the pencil are allowed by the rising and sinking of the tube J′. A spring J^2, carried on an arm J^3 from the carriage J, urges the tube and its attached pencil down gently upon the paper and yields as required.

S is an approximately-volute guide of sheet metal attached to the cross-bar M^9 and soldered or otherwise properly set in the interior of the casing M and arranged to receive a roll of paper S′, having one end free to guide the free end upward as the roll is revolved. The upper edge S^2 of this guide S is curved forward over the rear edge of the table M^8.

M^{10} is a door in the face of the case M opposite the end of the guide S nearest the center of the boat. It turns on hinges and is provided with an efficient fastening, which may be a padlock or other lock, if desired. To insert the paper, the paper being prepared in a proper roll with one edge free, the door M^{10} is swung open, the paper thrust into the interior of the guide S, and the finger of the attendant being thrust into the interior of the roll of paper and revolved the friction causes the roll of paper to turn and to project the free end upward to the top of the guide, where it is deflected forward and caused to move across the table M^8 and to be caught in the bite of the rolls K L. Now the door being shut and locked, the machine is properly conditioned for working. During the effective motion of the oar, that portion during which the pull is impressed by the oarsman, the paper stands still and the pencil *i* moves partially across from one side to the other of the machine, tracing a line on the paper, which is deflected one way or the other, according as the conflicting forces—that impressed by the oarsman through the oar urging the slide B forward and that received from the spring C urging the slide rearward—shall determine. During the idle motion of the oar back to position—the recover—the partial rotation of the feed-rolls K L draws the paper forward. During this movement the pencil moves idly backward to its place for the commencement of the stroke. This movement traces an oblique line on the paper which is of no special interest. The indications which are valued are those which are produced by the pencil during the effective portion of the stroke.

N is a cover, which, like the case M, may be of stout sheet metal. It turns on hinges at *n*

and is held closed by a fastening n'. The paper S', after it has passed through the feed-rollers K L, is urged against the interior of the casing and accumulates subject to a shield or guard N', which is attached to the cover N. When our casing is opened by the raising of the cover N, it brings this deflector N' with it; but when the machine is closed and the parts are conditioned for working this shield stands in the proper position to prevent the paper from entering the space occupied by the mechanism and insure its being properly stored in the small amount of space left for the purpose in the interior of the case M exterior to the guide S, ready to be drawn out and examined at leisure when required.

We may say, in conclusion, that this recorder, which can with a few moments' labor be attached to the outrigger in the place of the ordinary rowlock, will record accurately in regard to any given man while he is doing his regular rowing in the boat and the latter is moving on the water, first, the length of stroke; second, the position of the oar in getting in and out of the water relatively to the right angle to the center line of the boat—*i. e.*, the distance forward and the distance aft of of such line at which the blade of the oar gets in and out, respectively; third, the greatest amount of force the man exerts on the oar, and, fourth, the amount of force the man puts on the oar at each point of the stroke, which of course also gives the point of the stroke at which the greatest force is applied.

The second is a specially-valuable help to the captain in "rigging" his crew, for by comparing the registrations of the different men and moving the stretchers (or foot-braces) of each man accordingly forward or backward in the boat he can get the men to put their oars in and out of the water at the proper angles to the side of the boat.

What we have denominated the "pencil" may be any suitable marking device. We propose to use in some cases a fluid-ink pen.

Before commencing a trial the part should be in such adjustment that the pencil will rest on the center of the breadth of the paper when the oar is at right angles to the center line of the boat. To facilitate such adjustment, we provide the carriage J with an index, which may be either a mark or a slight finger extending downward. We make on the way H', contiguous to the path of this carriage, a mark or graduation h exactly in the center. The connection of the strap G' G^2 with the carriage J is made capable of slight adjustment by slacking the screw g, and the point of attachment is so adjusted that the mark on the carriage J exactly coincides with the graduations h on the way.

A center line s is drawn the entire length of the paper, either beforehand or during the working of the instrument. It is preferably drawn by hand or machinery beforehand, and the paper being guided accurately it serves with success. It may be drawn during the working of the instrument by a stationary pencil properly mounted. All such additions are objectionable by increasing the resistance to the motion of the paper. Such center line serves as a base from which to measure the excursions of the oar forward and back. When the pencil is on this line, the oar is at right angles to the center line of the boat.

We attach importance to the compactness of the mechanism, being all contained in a single small casing M, because it is easy to attach and detach; also, to the fact that the motion is taken from the top of the rowlock, because it exposes the mechanism to less risk of becoming wet; also, to the flexible belt, because it gives a uniform motion to the pencil exactly corresponding to the sweep of the oar, instead of changing the ratio toward each end, as is the fact when links are used; also, to the fact that there are two parts of the belt or strap G' G^2, pulling in opposite directions, because the motion is more efficient and reliable than can be attained by working the pencil in one direction by a spring or weight; also, to the lever P and the links as arranged, because such lever takes the motion from a point in the middle of the instrument and communicates it to the feed-rolls at one end; also, to the metal-cased pencil, because it allows of very delicate and close fitting; also, to the provision for adjusting the force of the spring C, because it allows all the instruments on the boat to be conditioned alike; also, to the shield or guard N' for shielding the mechanism and recorder, because it insures against the paper being misguided and becoming entangled in the mechanism; also to the guide S, with its bent upper edge S^2 and the door M^{10}, arranged opposite the same, because it facilitates the proper introduction of the paper.

We claim as our invention—

1. The rowlock E, having its lower pivot held in a fixed bearing and its upper pivot free to move forward and backward, in combination with the slide B, housing M, spring C, and pencil-holder J, and with connected mechanism for indicating by the motion of the pencil the extent of each stroke, the position of each stroke—that is to say, whether the man sits too far forward or too far backward in the boat—and the force of the pull at each point in the stroke, all substantially as herein specified.

2. In an oarsman's recorder, the carriage H, having transverse guideways H' H^2 and adapted to move forward and backward by the conflicting forces of the pull of the oarsman, and a spring, as C, in combination with such spring, and means for communicating the force of the pull on the oar thereto, and the wheel G, pulleys H^3 H^4, and transversely-moving carriage J, and pencil i, carried therein, all arranged for joint operation relatively to each other and to provisions for moving a recording-surface, as herein specified.

3. In an oarsman's recorder, the wheel G,

two pulleys H^3 H^4, and a belt G' G^2, running around such pulleys, in combination with each other and with a slide B, spring C, rowlock E, carriage H, and transversely-moving carriage J, carrying a recording-pencil, all arranged to serve relatively to each other and to a suitable recording-surface, as herein specified.

4. In an oarsman's recorder, the rowlock E, capable of partially revolving, as usual, the lever P, links O Q, and carriage J, carrying transverse ways H' H^2, and the lever R, pawl R^3, ratchet-wheel K', and feed-rollers K and L, combined and arranged for joint operation substantially as herein specified.

5. In an oarsman's recorder having a rowlock E, capable of both rocking horizontally and moving forward and backward under the force of the pull, the slide B, actuated by such rowlock and carrying a transverse carriage H, the spring C, adapted to act longitudinally against the slide B, and the adjusting means D, arranged to allow the tension of the spring to be varied at will, as herein specified.

6. In an oarsman's recorder, the feed-rollers K L and means for operating them to carry forward a strip of paper and provisions for marking on such paper, and the approximately volute paper-guide S, having the bent upper edges S^2, in combination with each other and with the door M^{10} opposite the end of such volute guide, all arranged to serve substantially as herein specified.

In testimony that we claim the invention above set forth we affix our signatures in presence of two witnesses.

JOHN BANKS.
JOSEPH H. BANKS.
WALTER B. PEET.

Witnesses:
RAE HARRISON,
M. F. BOYLE.