

XLV. Specification of the Patent granted to Mr. JAMES MITCHELL, of the Hamlet of Poplar and Blackwall, in the County of Middlesex, Rope-maker; for a Method of manufacturing Cables, Hawfers, or Shroud-laid Ropes, and other Cordage, on a scientific Principle.

WITH A PLATE.

Dated July 22, 1792.

TO all to whom these presents shall come, &c.
WHEREAS IT IS WELL KNOWN, that cables, hawfers, and other cordage of magnitude, have been manufactured on erroneous principles, that in the twist of a cable, or the strand of a rope, the external yarns circumscribing large circles, and the internal small circles, were productive of unequal bearings, and consequently that a cable, or large rope, had many yarns that did not act with the others. Nothing can exhibit this error more than crane ropes, especially those used at stone wharfs, where ponderous weights are to be raised, that will try their strength, and
also

also their property of resisting friction; these ropes, it is well known, always become ragged; the outside yarns break, and exhibit a porcupine appearance. It is also well known, that cables, and other large ropes for nautical uses, have their external yarns broke, and their internal ones fresh and unstrained. How it has happened, for ages past, that this error, in a manufactory of so much consequence, has continued, is not my present enquiry; but this error will, I trust, be remedied in future by the present discovery. It lies in the root or commencement of the process for manufacturing cordage; that is, in the cylindrical twist or one-ninth part of a cable, the cylindrical twist or one-third part of a hawser-laid rope; and the error increases as the girt of the rope increases, or as the component parts become more numerous: to remedy this error is the object aimed at. Having paid great attention to this subject, I have discovered, to demonstration, the superiority of a different process, by subdividing the twists or cylindrical parts of cables, hawsers, and ropes of large dimensions, and giving them a peculiar turn, so as to make them blend and unite; and also operating in such a manner that the component parts act in spiral directions, nearly approaching to parallels; and the rope, when thus made, acquires an increased
tension,

tenſion, from the yarns all bearing together ; and alſo combines every other property required, ſuch as reſiſtance of fluids and friction ; and that it acquires alſo a more uniform elaſticity. Such diſcovery being acted upon, will become not only of national utility, but univerſally ſo : inducements that have prompted me to apply for letters patent, that I may have ſuch benefit as may be reaſonably expected to accrue from a diſcovery of ſo much importance ; and, that it may be hereafter manifeſt to whoſoever may require information for that purpoſe, the following directions, with the annexed plan, will exhibit the proceſs.

Now know YE, that in compliance with the ſaid recited proviso, I the ſaid James Mitchell do hereby declare, that the nature of my ſaid invention, and the manner in which the ſame is to be performed, is particularly deſcribed and aſcertained as follows ; that is to ſay : The yarns are to be ſpun and laid horizontally in parallels, as uſual, the full length intended ; then let the number required for the cylindrical twiſt or one-ninth part of a cable, the cylindrical twiſt or one-third part of a hawſer, or twiſt of any other kind of rope, be divided into two, three, four, or more equal parts ; turn the ſubdivided twiſts, at the extremities, with the ſun, by means of a table-wheel and back-frame, or otherwiſe by means
of

Fig. 1.

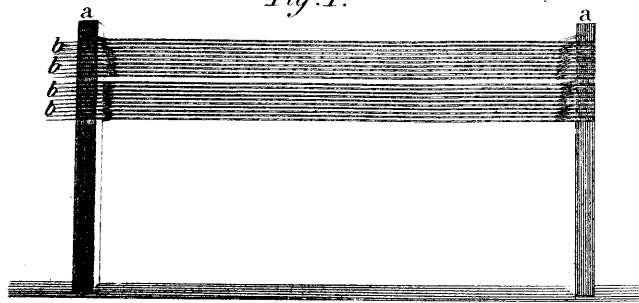


Fig. 2.

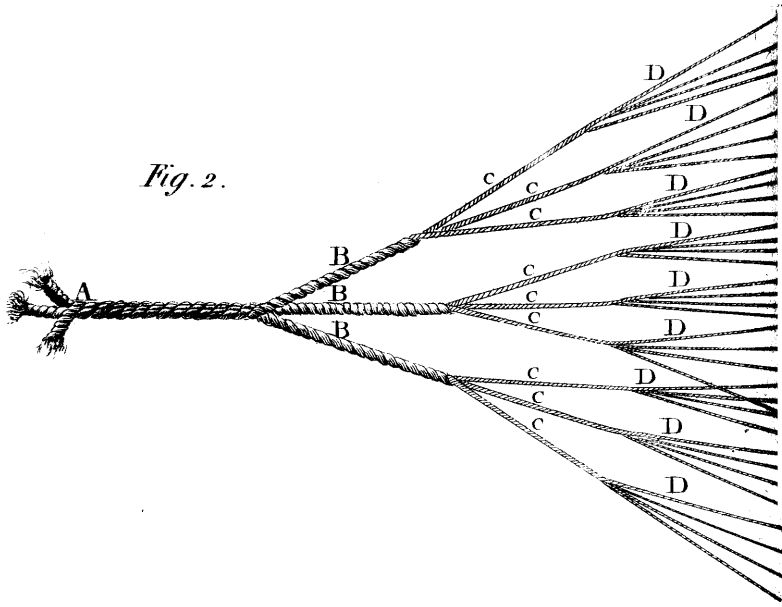


Fig. 4.



Fig. 3.



of the tackle-board and sledge, until the turn shall meet in the centre; then abate the turn at the ends, and render the whole as nearly alike as possible, taking care that each one shall be a separate and distinct column or twist; repeat the same in all the numbers of subdivided twists required, which, for distinction, I name selvagee twists: (selvagee twists are of two sorts, the proper one consists of several rope-yarns turned into a circular form, and marled together, Plate XIV. Fig. 3. the hand selvagee is the twist or strand of a rope with the turn abated, and then knotted, Fig. 4 :) bring together two, three, four, or more of these several selvagee twists, (as may be required for the strand of a rope, or twist of a cable,) at the extremities, by putting them on a forelock or neehook; at each end turn these hooks with the fun, as before, and unite all the parts into a cylindrical form, acting with press, as usual, and reduce or contract this cylindrical twist or strand, by turning the hooks or cranks, until it is shortened from one-eighth to one-sixth, as the compression will be found to vary from rope made in the usual way, and then the twist required will be obtained: proceed with the remainder of the process in the usual mode or way. When finished, it will be perceptible, that the yarns in the twists of large ropes, instead of circumscribing circles of

irregular and various diameters, which is the cause of unequal bearings, will, by these subdivisions, circumscribe small circles, of more equality; that the component parts or threads act together in lengthened spirals, nearly approaching parallels; and it will be visible, and convincing, that the rope acquires sufficient hardness, or compression to resist fluids and friction, and, on trial, will be found with increased tension or strength, and a more uniform elasticity; and this process applies to white as well as tarred ropes, as all descriptions of cordage are to be made in this manner, with or without tar. This manufacture is strikingly distinguished from every other mode yet made use of, or invented. Hitherto, cable-laid cordage has been composed of nine cylindrical twists, and hawser-laid cordage composed of three cylindrical twists, (four strand ropes excepted, which can also be made on this principle;) by the present invention, cable-laid cordage is composed of eighteen, twenty-seven, thirty-six, forty-five, fifty-four, sixty-three, seventy-two, cylindrical parts or twists, which, for distinction, I name selvagee twists, (from their resemblance to a hand selvagee,) or any number of them multiplied by nine; and hawser-laid cordage is composed of six, nine, twelve, fifteen, eighteen, twenty-one, cylindrical parts or twists, called

called also selvagee twists, or any number multiplied by three. The turn in the selvagee twists is peculiar to this manufacture, acting with each other, instead of reversing, so as to make them bed and unite, whilst the custom hath hitherto been to reverse the turn in every part of the process. These cylindrical twists are not procured by the act of winding, or so placed as to deprive them of their full re-active power, without which, rope of every description must be defective; but they retain their full re-action, unite and blend the parts so as to resist fluids, stand friction, acquire a more uniform elasticity, and make the whole of its component parts have equal bearings, or very nearly so; and it can be demonstrated, that any one, of less girt or circumference, is equal in strength to one made in the common way, of an increased girt or circumference. The equal bearings may be shewn by the selvagee twists, which cannot be disturbed by any subsequent part of the process throughout the whole operation, as may be made to appear by taking three, four, or more parts (that compose the whole twist) in the hand, and making therewith a circular movement, or by restoring the twist to parallels, as when the operation first commenced. On the whole, the present improvement is manifest, on view, both to the scientific world and every beholder.

The annexed drawing (Plate XIV.) will illustrate the process, and exhibit the cable in all its parts.

Fig. 1. The felvagee twists *b, b, &c.* are represented as taken from the table-wheel and back-frame, and stretched in parallels, with a temporary fastening, between the posts *a, a.*

Fig. 2. A. The cable. B, B, B, the cable strands. *c, c, c.* The twists which compose the strand. D, D, D. The felvagee twists, or subdivisions, which are united in that twist.

Fig. 3. represents a marled felvagee, used for setting up rigging, &c. &c.

Fig. 4. represents a hand felvagee, which is the strand of a rope, with the turn abated, and then knotted, and used for the same purposes as the marled felvagee. These felvagees are remarkable for their great strength, which is the reason why rope made on the new principle is called felvagee cordage. In witness whereof, &c.