taking a rope (say a clothes line) one hundred yards long, and attaching to one end a weight of about one hundred pounds (say a bag of grain) and at the other a man; let the man try and drag the bag, and after failing in which, let him drop the rope on the ground, and go to the bag end, and take hold at two feet, and pull in the opposite direction, letting the hundred yards of rope drag—to balance the dragging in the first instance. He will find, though he may keep his hand down on a level with the bag, that he can drag it quite readily.

If the connecting material was perfectly non-elastic, the scientific theory would be in a measure correct, but as that material has not as yet been discovered, the practical world must continue to lose power in overcoming its elasticity; hence the shorter the connection the less elasticity there is, and the more effective will be the power.

J. V. Henry Nott.

Guilderland, N. Y., Sept. 4, 1865.

[There is no doubt that the friction of a bag on the ground would be increased by the sagging of the rope by which it was drawn along, and power may be rapidly consumed in friction, especially where the direction is repeatedly changed. Let our correspondent try the experiment of raising a bag vertically by passing a rope over a pulley, and hauling alternately on ten feet of the rope and on a hundred feet, and see if he perceives much difference. So in transmitting his power, if he had had but one open belt a hundred feet long, touching nothing but its two pulleys, we suspect he could have run his three saws.—Eds.

THE CONGRESSIONAL REPORT ON ISHERWOOD'S MACHINERY.

[From the New York World.]

In every attempt which has been made to find out the actual performance of the screw-propeller machinery which Isherwood has proportioned and thrust into nearly all our new naval vessels, he has managed to so engineer the reports and statements of the work done by his machinery that the truth has been wholly disguised. The case in point, and the one which it is now propose to analyze, are the bogus tables which Isherwood furnished the Naval Committee, who were instructed to examine into the performance of the steam machinery planned by the Steam Bureau of the Navy Department. These tables, officialy furnished to the committee, and published by them in their report, were received without a doubt as to their truthfulness. In order that the incorrectness of these tables may be understood, extracts are given below (copied from the Congressional Report), together with the same particulars of the machinery of other naval propeller vessels, planned before Isherwood's reign commenced, and of several British naval vessels.

NAVAL SCREW-PROPELLED VESSELS WITH ISHERWOOD'S MACHINERY.

	Pitch of Screw.	Revolutions of Screw.	Speed of Vessel.
Lackawanna, Ticonderoga, Sacramento, Shenandoah, Monongahela, Adirondack, Juniata, Ossipee, Housatonic, Canandaigua ..	16½ to 18½ ft. mean, 17½ ft.	70	12 knots.
Nipsic, Shawmut and *Nyack* ...	14 to 16 ft. mean, 15 ft.	82	12 5 knots.
Penobscot class (19 of these)........	11½ to 13½ ft. mean, 12½ ft.	87	10 knots.

The screw propeller of the *Lackawanna.*, etc., at the above number of revolutions, advances 70 number of turns, multiplied by 17½ feet mean pitch, multiplied by 60 minutes in an hour, divided by 6,086 feet in a knot—12 7 100 knots per hour; thus, according to this untrue statement, the vessel is going within 7-100 of a knot as fast as the propeller itself, and not only that, but the forward part of the propeller, which is but 16½ feet pitch, is actually being dragged through the water.

On page six, of Congressional Report, the maximum speed of these vessels is stated to be 12½ knots per hour.

The *Nyack's*, etc., propeller, according to the revolutions given by Isherwood, advances 12 1-100 knots per hour; the speed of the vessel he states to be 12⅜ knots; thus she is going 38-100 knots faster than her propeller the forward part of propeller of course dragging.

The *Penobscot's*, etc., propeller, according to revolutions given by Isherwood, advances 10 7-10 knots per hour, 7-10th of a knot faster than vessel the forward part of propeller being dragged through the water.

This performance is like that of the man who attempted to lift himself up by standing in a tub and pulling on the handles.

It is known that the *Nyack*, in smooth water, makes with 35 pounds of steam 78 revolutions, and goes 10 knots, which gives a slip of 13 per cent, about what it should be.

It is also known that the *Penobscot* - a sample of her class even if she could make 90 revolutions, would not go 10, nor even 9½ knots per hour, under steam alone. The *Lackawanna* class will be discussed presently.

SEVERAL NAVAL VESSELS WITH MACHINERY OF THE USUAL PROPORTIONS, BY VARIOUS STEAM ENGINE FACTORIES, EXTRACTED ALSO FROM ISHERWOOD'S TABLES.

Vessel.	Pitch of Propeller.	Revolutions.	Speed of Ship.
Iroquois ..	19 ft.	77	11 7-10 knots
Dakotah	17 to 19 ft., mean 18	80 28-100	12 knots
Kearsarge	19 ft.	73½	11 2-10 knots

The screw propeller of the *Iroquois*, at the above number of revolutions per minute, advances 14 4-10 knots per hour, which is 2 7-10 knots per hour faster than the vessel progresses.

The screw propeller of the *Dacotah* advances, at the above number of revolutions per minute, 14 25-100 knots per hour, which is 2 25-100 knots per hour faster than the vessel progresses.

The screw propeller of the *Kearsarge* advances, at the above number of revolutions per minute, 13 76-100 knots per hour, which is 2 56-100 knots per hour faster than she progresses.

SEVERAL VESSELS OF SIMILAR CLASS IN THE BRITISH NAVY.

Doris—Screw-propeller, 30 feet pitch, 51 49-100 revolutions per minute; speed of ship, 12 4-100 knots.

Flying Fish—Pitch of propeller, 20½ feet, 81 8-10 revolutions per minute; speed of ship, 11 17-100 knots.

Ouracoa Pitch of propeller, 20 feet 1 inch, 64 revolutions per minute; speed of ship, 10 7-10 knots.

Dauntless—Pitch of propeller, 16 feet 4 inches, 70½ revolutions per minute; speed of ship, 10 1-100 knots.

Doris (propeller) goes 3 16-100 knots faster than ship.

Flying Fish (propeller) goes 5 33-100 knots faster than ship.

Ouracoa (propeller) goes 1 97-100 knots faster than ship.

Dauntless (propeller) goes 1 35-100 knots faster than ship.

RECAPITULATION OF THE SLIP OF ALL THE VESSELS.

Lackawanna, etc., (Isherwood), no slip, forward portion of screw dragging.

Nyack, etc., (Isherwood), vessel goes 3 per cent faster than screw, forward part dragging.

Penobscot, etc., (Isherwood), 7 5-10 per cent slip, forward part dragging.

Iroquois (the usual proportion), 18 per cent slip.

Dacotah (usual proportion), 16 per cent slip.

Kearsarge (usual proportion), 18 per cent slip.

Doris (English), 20 per cent slip.

Flying Fish (English), 32 per cent slip.

Ouracoa (English), 14 8-10 per cent slip.

Dauntless (English), 11 8-10 per cent slip.

Slip, it should be remembered, is the difference between the progress of vessel and propeller.

Such results, as Isherwood has thus officially stated, are obtained in the screw-propelled vessels fitted with machinery of his proportions, are thus clearly shown to be impossible. Such results cannot be accounted for by the anomaly, which in some rare instances has been observed in screw vessels, namely, "negative slip;" the stern lines of the *Lackawanna*, etc (Isherwood), and those of the *Iroquois*, *Dacotah* and *Kearsarge* are practically the same. It should be remarked that these revolutions of propeller and speeds of the several vessels, as given by Isherwood, are, of course, those supposed to be obtained in perfectly smooth water, the vessels uninfluenced by either wind or tide. This being the case any difference in the surface of the propellers, by different diameters, etc., cannot come to the aid of his disingenuous tables, particularly as the proportion of the propeller's disk—*i. e.*, the circle equal to its diameter—to the midship section in both the *Lackawanna*, *Juniata* etc. (Isherwood's), is nearly the same as that of the *Iroquois*, *Dacotah* and *Kearsarge*. This proportion in the *Lackawanna* is as 1 to 2 6-10; in *Juniata*, as 1 to 2 8-10; in *Iroquois*, as 1 to 2 4-10; in *Kearsarge*, as 1 to 2 8-10; In *Dacotah*, as to 2 97 100.

Unfortunately for himself, in another sense than the wickedness of the deceit itself, Isherwood, in his statement of the revolutions, speed and power developed by the vessels with his engines, has supplied data from his own figures, which prove at once the utter inefficiency of the machines he has proportioned Marine engineers throughout the world have an expression for comparing the performance of engines, hull and propeller collectively, called the "coefficient of performance." This coefficient, as may be seen in any engineering primer, is found by multiplying the area of the midship section in square feet by the cube of the velocity in knots, and divided by the indicated horse-power.

Of course the *higher* this coefficient the better the performance.

Performing this simple operation on the several United States vessels already mentioned, using Isherwood's statement, the following result is obtained:—

Lackawanna and *Ticonderoga* (Isherwood's), 613; *Sacramento* (Isherwood), 609; *Monongahela* (Isherwood), 614; *Adirondack*, *Juniata*, *Ossipee* and *Housatonic* (Isherwood), 604; *Canandagua* (Isherwood), 628; *Shenandoah* (Isherwood), 628; *Iroquois*, 747; *Kearsarge*, 771; *Dacotah*, 733; *Oneida*, 747.

Now, as the hulls of these vessels are of practically the same model, they offer relatively, with the power which Isherwood states they exert, the same resistance in passing through the water. This being so, the comparison, as shown by their coefficients, appears to be solely between the engines, "*per se*," (as Isherwood would say), so it is clear that the only way to account for the inferior performance of those vessels with his machinery, is in the mal-proportion of the engines "*per se*."

Although this gentleman states that the power developed by his engines, in the above vessels, was 1,304 horse-power, it is plain that but a small portion of this power could have been expended in pushing the ship through the water; the rest was wasted in the friction and heated bearings, which are inseparable —at the number of revolutions he says they make— in engines of such outrageous mal-proportions. Now, the *Iroquois*, well known as one of the fastest and most successful vessels in this or any other navy, according to Isherwood, exerts 813 horse-power, with boilers of the same style and almost exactly the same amount of grate and heating surface as the *Lackawanna*, etc., fitted with the machinery of his proportions, which he asserts exerts 1,304 horse-power. It is plain that the boilers of the *Iroquois* will boil off nearly as much water, consuming the same amount of coal as her sister's, with Isherwood's proportions, yet he makes a difference of 491 horse-power —nearly 40 per cent—in these vessels, a result which, "*cæteris paribus*," is simply impossible; such a difference in the steam power of these vessels cannot exist. No doubt he has the assurance to assert, judging from his "precedents," that his *Lackawanna* engine gets from 30 to 40 per cent more work out of the steam than the *Iroquois* engine, which is fitted with a good *independent cut-off*.

If, according to his own tables, his sloops cannot create the power he states, what becomes of his twelve knots? By a triumph of arithmetic, his 1,304 horse-power is just about what his engines would give if they carried forty pounds pressure in the boilers, and seventy revolutions; but with this power the mean pitch of screw only advances twelve knots, and the forward part is being dragged through the water.

Isherwood himself says in one of his "papers" in the *Franklin Journal:*—

It must be distinctly remembered that a negative slip (the vessel progressing faster than the propeller) can only happen when the vessel has a high speed, *and owes a considerable portion of it to a power additional to that applied to the screw*—that of the sails for instance; though it has frequently been reported to exist, when the vessel was being propelled by the screw alone. In these cases, it was manifestly the result either of *inaccurate observations of distance gone and revolutions made*, or of a mistake in the pitch of the screw, reckoning it less than it really was.

The only conclusion which can be arrived at is, that in order to exaggerate the performance of his own vessels, he has overstated both their power and speed, and underrated that of the others, the engines of which are built on the usual plans. For this transparent trick he should be subjected to the severest censure.

It is generally known that it was with great difficulty the engines of the *Lackawanna*, *etc.*, could be made to go at all, on account of the defects in the main valves, and that these engines are so overloaded with unnecessary material, that the friction and chronic state of heat of the principal bearings entirely precludes the possibility of working off the steam; which the boilers, if in proper order, should supply them.

The *Wyoming*, a vessel of the *Iroquois* class, is fitted with one of the very finest pairs of engines in the navy, of the usual proportions adopted by the most successful makers in America, France, England, Sweden and Russia, and arranged with a good *independent* cut-off.

A comparison, therefore, between these engines and these proportioned by Isherwood, for the *Lacka-*

wanna, etc., will illustrate his professional ignorance.

The *Wyoming* has two cylinders, fifty inches in diameter by thirty inches length of stroke; the *Monongahela* (*Lackawanna* class, Isherwood's) has two forty-two inch cylinders by thirty incnes length of stroke. Assuming that the former carries twenty-five pounds of steam and the latter thirty-five pounds, the strain put on the *Wyoming's* engines is five thousand nine hundred and fifty-eight pounds greater than on the other, yet Isherwood has put into the *Monongahela*, etc., seventy-eight per cent more cast-iron, sixty-eight and a half per cent more wrought iron, one hundred and seven per cent more brass, and sixty per cent more weight in the reciprocating parts than the *Wyoming* engine, which, as before stated, is one of the most perfect in the naval service. There is no doubt (see his specifications) but that he intended these sloop engines to make a greater number of revolutions than those of the sloops *Iroquois* and *Wyoming*, as he employed a propeller of finer pitch, but in consequence of his mal-proportions, so much power is absorbed in excessive friction when running, as he states, at 70 revolutions, developing 1,304 horse-power—587 more than the *Wyoming*—he is not able to make as many revolutions as that vessel does with a screw of much greater pitch. Mr. Bartol, one of our first marine engineers, said, before the naval committeee, "I do think putting in engines of excessive weight *has been fatal to the naval engines.*" These facts are conclusive as to the professional incapacity of the chief of the Naval Steam Bureau. Perhaps Isherwood will meet these damaging statements by insisting that his tables are right, and producing, as he did once before, letters from dependent contractors and engineers, stating that his vessels, under steam alone, advanced through the water faster than their propellers were progressing. But this question is one of easy determination. Let one of these sloops, with the naval committee on board, be run from New York to West Point and back; the evidence of any intelligent person, noting the speed and number of revolutions, would be just as reliable, and perhaps more so, than any number of "expert" affidavits obtained under the circumstances which he obtains his. This trial would give much more valuable information than a trip on the Potomac with an old-fashioned American poppet valve-expansion paddle-wheel engine (the same as has been used in the merchant service for twenty-five years)—a trial got up for the purpose of throwing dust in the eyes of his superiors.

RHADAMANTHUS.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Apparatus for Putting up Work on Knitting Machines.—This is an apparatus for setting up work on knitting machines, by the aid of which the work may be set up in a knitting machine almost instantly, without the aid of old work. By this means a great saving of time is secured upon any knitting machine to which it may be adapted, in renewing the work, when, by accident, it may have run off a machine; but its value is especially apparent in the facility it affords for knitting the heels of stockings. Isaac W. Lamb, of Rochester, N. Y., is the inventor.

Watch and Purse Safe.—The object of this invention is to protect watches, purses, and other articles of value from being stolen from one's person by pickpockets or other thieves. It consists in constructing a safe which fits within, and is sewed or riveted fast to, the pocket of a garment, and which is made in two parts that become separated in order to receive the watch or other article to be placed in it for safe keeping. C. W. Devereux, No. 180 Ninth avenue, New York, is the inventor.

Insoles for Boots and Shoes.—This invention consists in coating, in any proper manner, the inner side or surface of the sheep-skin, used for the insoles of boots and shoes, with a suitable enameling or protective composition. By this means the skin is not only prevented from wrinkling or stiffening, but it is also rendered impervious to moisture, either from the perspiration of the foot or from the penetration of water through the leather, or other material, of which the boot or shoe is made. John K. Gittens, of Brooklyn, N. Y., is the inventor.

Opening the Veins of Oil Wells.—This invention consists in opening the veins and crevices of oil wells, by forcing the water and other liquids which are in the well into the said veins and crevices, and thereby removing the obstructions thereout, so as to permit the gases and oil to resume their flow. Isaac Relf, of Minago, N. Y., is the inventor.

Packing for Tubes of Oil and other Wells.—This invention relates to packing the tubes of oil and other wells which are to be protected from the inflowing of surface water, and of water from springs and other sources. It consists in applying a series of flat springs, arranged lengthwise, in the form of a cylinder, about a well tube, the latter being divided or made in two sections, within the points inclosed by the springs, and their ends connected by a coupling in such a way as to make a sliding joint. The ends of the springs are fixed to the different sections of the pipe, and the several springs are inclosed by a cylinder of gutta-percha or other suitable elastic material. Francis Martin, No. 52 Barrow street, New York, is the inventor.

Folding Seat for Wheel Vehicles.—This invention relates to a folding seat for wheel vehicles—such as are provided with a back and sides—and it consists in attaching the back and sides of the seat to the latter, and arranging the same in such a manner that the back and sides will automatically fold and unfold as the seat is turned up for use and turned down when not required for use. Henry A. Gilbertson is the inventor, who has assigned it to Wood Brothers, 596 Broadway, New York.

Rigged Oar or Boat Fin.—This invention relates to a means for propelling small boats—row boats, commonly so termed—and is designed as a substitute for, and an improvement upon, the common oar now used for such purposes. This propeller, which the inventor terms a rigged oar or boat fin, consists in attaching to each side of the boat, by joints, one or more blades or paddles, arranged with rods in such a manner that the operator may work said blades or paddles to propel the boat forward while sitting with his face toward the bow, and, at the same time, have perfect command over the boat, and apply his power in a direct and far more favorable manner than by the ordinary oar. Ralph Smith, of Brooklyn, N. Y., is the inventor.

Automatic Press.—This invention relates to a press designed for striking up or swaging articles into various forms, and consists in the employment of a feed wheel in connection with a driving wheel, a bolster plate, a slide and a cam, all arranged in such a manner as to admit of the work being performed automatically and expeditiously. Peter Hayden, of Pittsburgh, Pa., is the inventor.

Let-off Motion for Looms.—This invention consists in making the reed, or that part of the batten which comes in contact with the woven fabric in beating up, yielding, and combining it by means of levers, pawl and ratchet wheel, with the yarn beam, in such a manner that, when the batten moves forward, and its yielding portion comes in contact with the woven fabric, in beating up, the pawl is drawn back more or less, according to the force which said yielding part of the batten has to overcome in beating up, and when the batten falls back the yarn beam is turned in proportion to the motion previously given to the pawl, and, consequently, the let-off motion is regulated by the force of the blows exerted by the batten in beating up, and the texture of the fabric produced is of uniform density throughout. Samuel Estes, of Newburyport, Mass., is the inventor.

Steam Boiler.—This invention consists in placing the furnace or fire-place of a steam boiler at or near the top of the same, in such a manner as to have there the highest heat, causing, at the same time, the hot gases to descend toward the bottom of the boiler, either in a zig-zag direction or otherwise. By these means different degrees of heat are produced in the water, the highest degrees being always on the top, and the lowest at the bottom of the boiler, and, consequently, no circulation of the water will take place, as in ordinary boilers, whether the water is made to pass through the tubes or outside of them, and whether those tubes are placed in a horizontal, vertical, or any other convenient position; and, furthermore, the heated gases being brought in contact with water of gradually decreasing temperature will be deprived of all their heat, or nearly so, before they are allowed to escape through the chimney. R. Rafael, of the Delamater Works, New York City, is the inventor.

Fresh-water Apparatus.—This invention relates to an improvement in that class of apparatus known as "Lighthall's Fresh-water Apparatus," its object being to condense a sufficient quantity of steam to obtain water for injection which is free from all air and other impurities. In Lighthall's apparatus the exhaust steam from the cylinder passes into a box which is filled with a large number of pipes terminating in chambers which communicate with an unlimited supply of cold water. If used on board a vessel, said chambers communicate with the open sea. By coming in contact with the cold surface of these pipes, the steam is condensed, and a sufficient quantity of pure water, free from air, is obtained for the injection. This water, however, is not cooled down to the desired degree of temperature unless the apparatus is made very long and expensive. The improvement which forms the subject matter of this present invention consists in passing the pipe, which serves to draw the injection water from the condensing chamber through the chamber or chambers at one or both ends of the condensing chamber, either in a direct or in a serpentine line or coil, in such a manner that the injection water, while passing through said chamber or chambers filled with cold water, is cooled down several degrees without increasing the size or capacity of the condensing chamber or without materially increasing the cost of the apparatus. Thomas Callan, of Philadelphia, Pa., is the inventor.

Cornet.—This invention involves, or rather creates, an entire change in the construction and shape of the cornet. It involves also a different manner of holding the instrument in playing, and the operator has great facility in sustaining it, in operating the keys, and in relieving the instrument of water. The invention will be understood by an expert from the claims alone, without an elaborate explanation. Louis Schreiber, of New York city, is the inventor.

Production of Steel by Means of Gases.

M. Aristide Berard brought before the Academy of Sciences, at its sitting on June 26th, his method of forming steel by means of gases. It consists in alternately oxidizing and reducing cast iron in a furnace suited to the purpose. The oxidation is produced on one portion of the cast iron, by the introduction of atmospheric air, and the reduction on another by a mixture of hydrogen and carbonic oxide, previously freed from sulphur. After twelve or fifteen minutes the processes are reversed, the portion subjected to oxidation being submitted to reduction, and *vice versa*. Any oxygen evolved is absorbed by burning coke placed in a suitable position. When this alternate act on is found by trial to have been continued long enough the operation stops, decarbonization being the terminating process. During oxidation the bases of the metals proper and of the earth are oxidated; the sulphur, phosphorus, etc., form acids, and escape. During reduction, the iron is brought to the metallic state, and the earths separate as scoria, any remaining sulphur, phosphorus, etc., being eliminated as acids, and some carbon is restored to the iron. A high temperature is produced during oxidation, a low during reduction. Ten or twelve tuns are manipulated at each operation in the establishment which has been formed by the inventor; and the steel produced is said to have all the properties of the ordinary kind. —*Trade Circular.*

CATERPILLARS FOR WELDING IRON.—The Pittsburgh *Chronicle* says:—"Workers in iron, when they wish to weld a joint, use borax as a flux. An intelligent gentleman of this city, who is curious in facts of natural history, says that on one occasion a blacksmith near his residence having no borax, a man hanging round the shop told him he could get a substitute, and brought him a number of caterpillars, which, being applied to the heated iron, made as strong and firm an adhesion of the metal as the borax."

[Workers in iron who understand their business can make "a strong adhesion" of iron without either caterpillars or borax.—EDS.