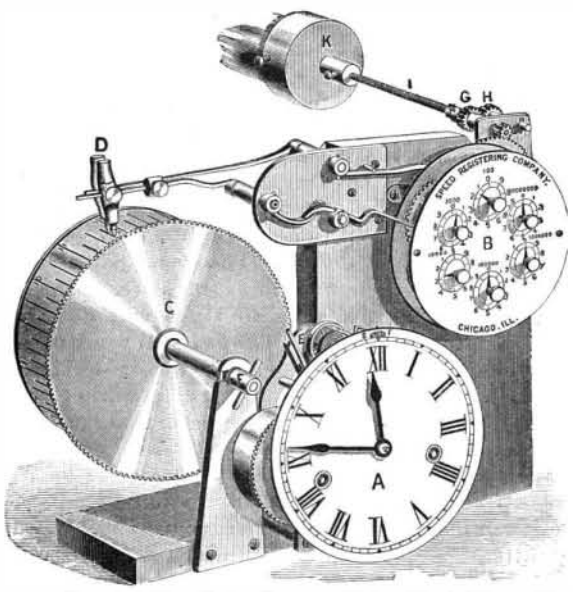
A REGISTER AND RECORDER FOR REVOLVING SHAFTS.

The illustration represents a mechanism, patented by Mr. Solon M. Terry, of Pittsfield, Mass., for registering the number of revolutions of a shaft running any kind of machinery, and also for registering any inequalities which may occur in the speed, recording also duration



THE TERRY SPEED REGISTER AND RECORDER.

of stop, the time of day and the day of the week when the irregularities or stoppage occurred. It is probable that there are but few manufacturing concerns in the country which would not save money, and some of them very considerable amounts, by the use of a device for the purposes accomplished by this mechanism. At the present time competition in all industries is exceedingly close, and the manufacturer who does not look carefully after all the small wastes in his business has but little chance of success. The wastes occurring from running below speed, from irregular speed, and from stoppages, where many hands are employed, are items that too often escape proper attention, and in many cases the employers probably have no conception how large a figure they make, while there are probably few shops run with such regularity that the introduction of such a mechanism would not contribute to an increased efficiency.

The registering mechanism, B, includes a front and rear metallic disk, in which is journaled a shaft carrying a large toothed wheel back of the rear disk, this wheel being adapted to mesh with a pinion, G, to be driven by the drive shaft whose revolutions are to be recorded. This pinion is preferably on one end of a short flexible shaft, I, on the other end of which is a cap, K, to be tightened on the driving shaft. There are ten times as many teeth on the large toothed wheel as on the pinion, so that it requires ten revolutions of the drive shaft to turn the large wheel once. In the disks are journaled five other shafts, each having a pinion and intermeshing gear, so that the first shaft turns the second, the second turns the third, and so on up to the sixth, each shaft, by its complete revolution, turning the following shaft only one-tenth of a revolution. The outer ends of the shafts extend through their bearings in the outer disk, where their ends are tapered and a dial, B, is secured with six separate scales, or one for each shaft, an indicator hand being so secured by an adjustable cap to the end of each shaft as to rotate therewith, while it can be readily turned back, when it is desired to start the hands anew at O, by a firm pressure of the fingers. Upon one of the shafts is a lug, and on the main back plate is pivotally mounted a lever adapted to be tripped by the lug with each revolution of such shaft, the lever having on its other end a sharp point or marker, D, normally held in contact with a strip of paper on a recording drum. Upon the main vertical back plate of the registering mechanism is mounted a clock, A, the mainspring shaft of which is extended to the rear and carries a broad-toothed gear wheel adapted to give motion to the recording drum, C. This drum is designed to make two revolutions in twenty-four hours, and has a central longitudinal screw-threaded aperture, in which fits a screw arranged to give a lateral motion to the drum as it is rotated by the gear wheel on the mainspring shaft of the clock, so that each succeeding row of marks or perforations made by the marker will be separate and distinct from the preceding row. Upon the periphery of the drum is removably secured a record strip, which preferably has the days, hours, and divisions of hours printed thereon for a whole week, as partly shown in the diagram, which is a sample of a record as made according to this invention between the hours of 1 and 3:30. The speed of the drive shaft at the time this record was made was 200 revolutions per minute, and the absence of marks on the record at 2:20 Thursday indicates a stoppage of the shaft at that time. The clock employed in connection with this register is a superior eight-day marine movement, with a double spring, and when once adjusted in the position it is to occupy, is designed to make an absolutely perfect record, showing not only the times of regularly starting and stopping the machinery and all intervening stoppages, but the exact rate of speed for each portion of every hour during the week, whether this comes from great differences in the work done, or low or high pressure steam in a steam engine, or a variable flow of water in a water wheel plant. The entire registering and recording mechanism, except its connection with the drive shaft, is inclosed in a substantial case, the key to which may be kept by the factory owner or superintendent.

This device is manufactured by the Speed Registering Company, of Chicago, Illinois, and is being placed with manufacturers at a low rental, by Mr. S. H. Pomeroy, general agent, Pittsfield, Mass.

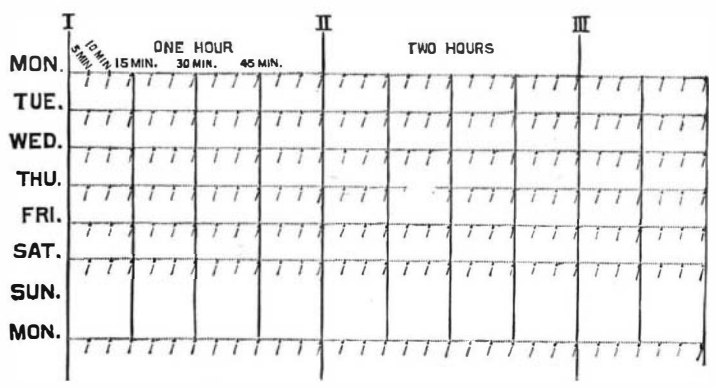
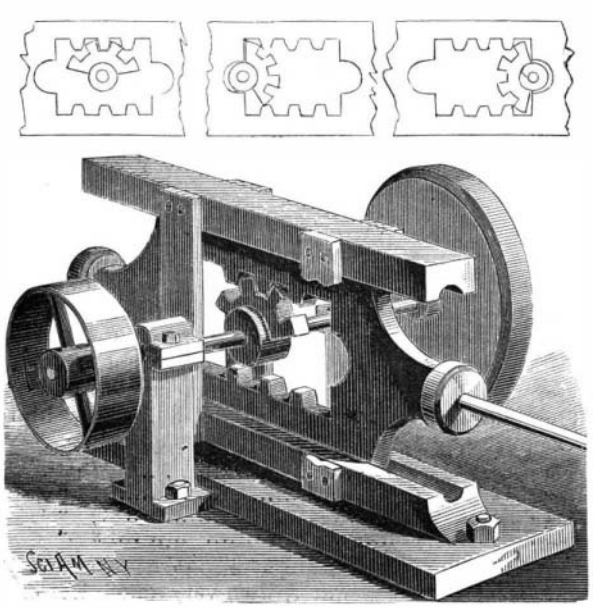


DIAGRAM OF RECORD MADE BY THE TERRY SPEED REGISTER AND RECORDER.

AN IMPROVED MECHANICAL MOVEMENT.

A device for converting reciprocating into rotary motion, avoiding all dead centers, and designed to transmit power without any undue friction or lost motion, is shown in the accompanying illustration. On the base plate is arranged a longitudinally extending guideway, vertical plates from which support at their upper ends a second guideway, and in these ways slides a frame having heads at each end, the rod connected with the machinery furnishing the reciprocating motion being secured to one of the heads. Within the frame is an essentially rectangular opening, the bottom and top sides of which each have three rack teeth, while the inner ends thereof are centrally recessed, and have top and bottom shoulders. The top and bottom rack teeth are adapted to be alternately engaged on each forward and backward movement of the frame by the teeth of a segmental wheel secured on a transverse shaft, having a fly wheel and the usual pulley connected with the machinery to be driven. The small views represent the manner of contact of the teeth of the segmental wheel with the rack teeth and shoulders of the sliding frame at different positions of the reciprocating rod, whereby a continuous rotary motion is imparted to the transverse shaft.

For further information relative to this invention address Mr. James Hayton, the patentee, No. 3 Mortison's Avenue, Fifth South, between Second and Third East, Salt Lake City, Utah.

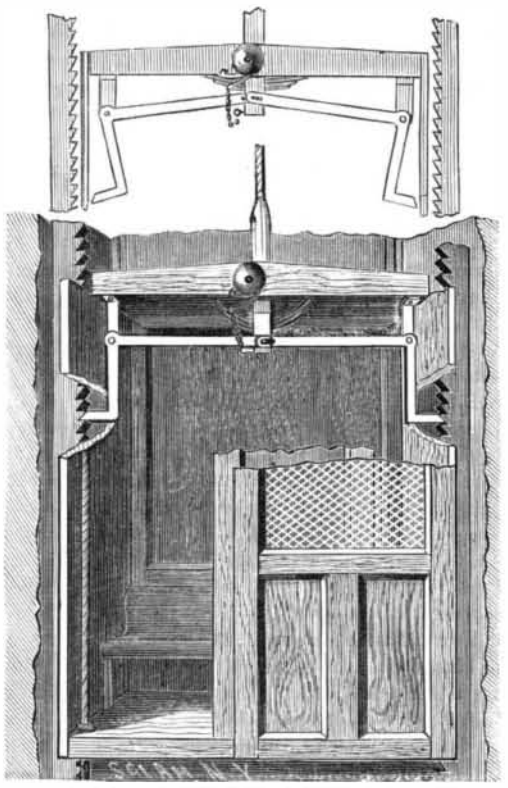


HAYTON'S MECHANICAL MOVEMENT.

SIR CHARLES PALMER says, thirty years ago, 7·47 men were employed in British steamers per 100 tons, whereas to-day the ratio is 2·88 men per 100 tons. In 1850 the total of steam tonnage owned in Britain was 167,698 tons, and last year 4,717,730 tons.

AN IMPROVED SAFETY INDICATOR FOR ELEVATORS.

The illustration represents a simple and practical device whereby the condition of the automatic safety attachments to a passenger or freight elevator will be

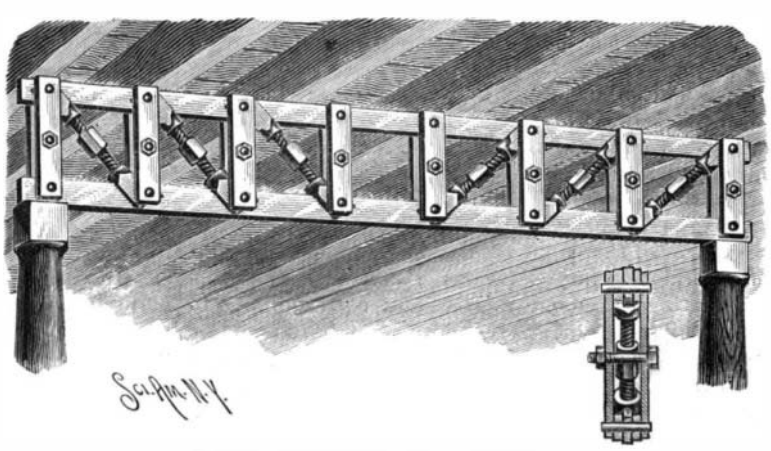


LYNN'S SAFETY INDICATOR FOR ELEVATORS.

audibly manifested at every reciprocal movement of the elevator car. It has been patented by Mr. Joseph Lynn, of No. 275 Walnut Street, Holyoke, Mass. To the opposite side walls of the elevator shaft are secured toothed racks adapted to permit an upward sliding movement thereon of the toes of bell crank levers, while preventing any downward movement when such toes are brought into engagement with the teeth of the racks. These levers are pivoted at their corners upon depending bracket arms secured on the under side of the top cross bar of the car, their inner ends being lapped upon each other and longitudinally slotted where they have contact with and are loosely secured by a bolt to a central bracket block. This block at its lower end forms the support for a semi-elliptic leaf spring, the ends of which bear upon the lower surface of the cross bar. The elevator cable is secured to the upper end of the block, which slides up and down through the cross bar with the movement of the spring. The spring is compressed, as shown in the top view, when the elevator car is suspended from the cable; but when the car is seated on the shaft bottom, the spring assumes the position shown in the main view, the toes on the crank arms being then projected outward, a position which the springs would likewise cause them to assume, and stop the downward movement of the car, in case of the breaking of the cable with the car suspended therefrom at any point in the shaft. To prevent accident from an inoperative or defective condition of the spring, an alarm or signal bell is provided, to be struck by a crank hammer operated by a flexible connection with the block supporting the spring, so that each time the cable is slackened the downward movement of this block will cause the bell to be struck. Should the bell fail to sound on the car reaching the bottom of the shaft, the absence of the signal would be an indication of a defect calling for immediate attention. It is evident that this safety indicator can be used in connection with any form of safety clutch besides the one shown in the illustration.

AN IMPROVED LIFTING TRUSS GIRDER.

The illustration represents a contrivance by means of which it is possible to raise floors, ship decks, etc., which, through sagging, have dropped below their



OLSEN'S LIFTING TRUSS GIRDER.

proper level at or near the middle, or it can be fastened underneath, on the side of, or above a joist, or on the side of a wall, and be made to bring an immense pressure to bear in any desired direction. In its construction are employed horizontally extending stretchers, preferably made of steel or iron, and pivotally connected by vertical links, the latter being connected at their centers by transverse bolts. Extending obliquely between the stretchers are turn buckles which have bifurcated end portions embraced between opposite ends of adjacent links at the points of connection between the latter and the stretchers, as shown in the sectional view, the pivots extending not only through the end portions of the links, but through the bifurcated portions of the turn buckles and through the stretchers. Comprised in the turn buckles are screws having oppositely threaded portions, which extend in reverse directions and engage screw-threaded apertures in the bifurcated portions of the turn buckles, there being combined therewith central hand pieces, shown of octagonal form. By means of the hand pieces the screws may be rotated to cause the bifurcated portions of the turn buckles to be moved nearer to or further from each other, when the stretchers will be correspondingly bowed or curved. This lifting truss girder may also be made with four stretchers, and can be made very strong and light, to suit any purpose. By manipulating the screws the girder can be bent both ways; if put under a floor that has sagged, the girder can be bent to fit, until properly fastened, and then by turning the screws in the opposite direction the floor will be brought to its proper level. After its proper manipulation it may, if desired, be permanently left in place to uphold the flooring or whatever else it may be applied to.

For further information relative to the above invention, address Mr. A. Olsen, the patentee, Ephraim, Utah Territory.

A Science Theater.

BY PROF. RUFUS B. RICHARDSON, PH.D.

Germany is not generally looked upon as the land of novelties; but Berlin possesses one novelty so important that it seems worthy of attention and description. Every day one sees on each of the several thousand large wooden columns standing at almost every street corner, along with the other theater announcements, the following: "Urania, in the Science Theater (*Wissenschaftliches Theater*), at 8 P. M.; The Primeval World," or, on another day, "The Journey from the Earth to the Moon." If one follows this standing invitation, he will see something interesting. If he chooses the "Journey to the Moon," he will find that he has a popular lecture on astronomy actually put upon the stage.

In the place of actors, to be sure, one finds a single reader or declaimer, who mounts a desk in front of the curtain and gives the lecture to the audience; but all the scenic effects which the stage affords are called in to aid the lecture. After a short prologue on the purpose of the lecture, the curtain rises on a scene near Berlin on the morning of the last great eclipse of the sun, August 19, 1887. Morning twilight comes on. The world begins to stir in anticipation of the usual sunrise, when lo! in the place of the usual sun, up comes a blood-red sickle, which soon disappears, and weird lights appear around a black disk. Nature is shrouded in a veil worse than pitch darkness. Animals feel the terror which men uninstructed to look for such a phenomenon used to feel. The tension is soon relieved by the reappearance of the sickle reversed, and the gradual passage into an everyday light. The lecture all the while proceeds, explaining the cause of the strange phenomenon; *i. e.*, that the moon has come between the earth and the sun. Attention being thus fastened upon the moon, the spectators are made to approach that body by successive scenes.

The next scene affords a look at the earth from a point of view in space at some distance from it. We now see how the same eclipse appears from this point, and see the shadow of the moon sweeping over a small area of the great revolving globe, moving eastward from Berlin over the Russian border, taking its course between St. Petersburg and Moscow into Asia, where we leave it on the dropping of the curtain. In the next scene one sees an eclipse of the moon from a point in space where he beholds both earth and moon in their relative size, and sees the moon pass into the broad shadow of the earth. Thus by two successive stages one is brought nearer the moon, until he sees it as the most powerful telescopes present it. With the mountains all spread out before the sight, a disquisition on the moon's surface is intelligible and impressive.

Not to give every detail, one is at last introduced to the surface of the moon itself. The grandeur of that dead world is an impressive scene. Then comes a scene representing the moon by earth light, corresponding to our moonlight night, resolved into sunlight at the close of the scene, as the sun rises wasting his glory on those desert fields. Then we are shown an eclipse of the sun as seen from the surface of the moon, or how things look there on the occurrence of what we call an eclipse of the moon.

Returning to the earth with a comfortable "home again" feeling, but with a new interest in all the operations of our satellite, we have a magnificent scene in the High Alps, sunset, evening glow, and following eclipse of the moon, in which the disk is seen still dull red in the earth light, which we had already seen surrounding us when we witnessed from the moon the same occurrence, or what there appeared as an eclipse of the sun by the earth.

Then comes the closing scene, a sunset in St. Paul, a volcanic island of the Indian Ocean, accompanied by a comparison of the so-called volcanoes of the moon with those of the earth. The scene painter has exhausted his art to leave on the mind of the spectator an impression of the glory and beauty of earth encircled by sea and sky and lighted by the glorious sun. The two hours' instruction closed with an appeal to the feelings. The same chords are touched upon which great Nature plays in summer evenings when we have all felt more than we can express.

The other representation, "The Primeval World," a lecture on geology, is incomparably more effective in its scenic display. The twelve scenes present the world in its various conditions from primeval chaos down to the present, with the convulsions through which it passed. It would be tedious to catalogue each scene. Particularly grand is a "Volcanic Outbreak of the Devonian Age," which changes the whole face of nature. Impressive also are the "Forest of the Carboniferous Age" and a "Jurassic Landscape," with its giant lizards. When the eleventh scene presents the "Lake of Zurich," with the morning sun rising upon a simple community of lake dwellers, one feels that the reign of monsters is over, and wants to rise and shout "Hurrah for man!" But when a Mediterranean shore is introduced crowned with eloquent ruins, and pensive music fills the air, the feelings are toned down, and the spectators are sent home in somewhat of that quiet, thoughtful frame of mind in which the old Greek tragedy was supposed to leave them.

The story of the origin of the Urania Institute, of which the theater is only one branch, is a very interesting one. Some years ago Professor Forster, the director of the Berlin Astronomical Observatory and a professor in the university, was troubled by the great number of people, not students, who wished to look at the moon and other heavenly bodies through the observatory telescopes. It did not seem right to shut them out. Germans always have sympathy with one who "wants to know." The observatory management proceeded in a patient German way to take applications and to accommodate the applicants in order so far as possible. But the calendar became clogged with applications six months in advance. Professor Forster appealed to the government, the first and natural resort of a German, for an appropriation to set up telescopes in a separate building, to supply the evident demand. He failed to secure the appropriation.

After this there gradually matured in his mind and the minds of several of his associates the idea of an institution of popular instruction, with not only telescopes but a great quantity of physical apparatus. Then came the thought of calling in that great auxiliary, the stage. Thus what, as a benevolent enterprise confined to the simple scope of giving people a chance to look through telescopes, was about to be abandoned for lack of funds now became a promising financial venture. A stock company was formed, and the result was the Urania. It has already been in operation a year, and has, I am told, paid eight per cent on the investment. Yet so strong is the feeling that an educational institution of this sort should be supported by the State, that the proprietors still talk of having the government take it off their hands and give it an assured durability.

The actuating motives of the projectors of the Urania were not mercenary. The movement was in *spirit* rather like that of the University Extension movement in England. These men felt that a good deal of the pleasure of the poorer people of Berlin was rather crass. To the minds of many, beer drinking has a proper limit, which has been widely overstepped in Germany.

Then, again, the larger theaters, particularly the Royal Theater, supported by the government, though powerful educational aids, could not reach the poor, who could not afford to buy tickets. The cheap theater, on the other hand, furnished often cheap stuff, if not worse. Thus came the desire of a cheap theater which should at the same time be above reproach and yet be interesting.

The institute is open from noon until 11 P. M. In the evening before the theatrical representation you may see crowds of Germans who "want to know" investigating microscopes, spectroscopes, phonographs, electric railways; in fact, all sorts of electric and magnetic apparatus, and other apparatus, a catalogue of which would be too long to give. Near each piece are "Directions for Use," and willing directors are also constantly moving about the rooms. The six large telescopes have unfortunately been of little use for most of the summer, as rain clouds hovered over Berlin, dropping rain every day for a month and a half previous to July 14, giving a grim humor to the remark in the "Journey to the Moon" that the view of the moon which is *here* vouchsafed is independent of the weather. It should have been remarked earlier that the eclipse of 1887 is here given as it ought to have been, and not as it actually presented itself.

Occasionally in the place of the stage representation a regular lecture is given. Dr. Schultz-Hencke gives two lectures on photography on two consecutive evenings, with abundant apparatus and experiments on the stage.

The characteristic feature and the drawing power of the institute is, however, its novel theater. The lectures that form the basis of the representations are admirably written by Dr. M. Wilhelm Meyer. But they are probably no better than Professor Young could write. In the Urania, however, they go in at the eye as well as at the ear. The scene painter and the declaimer are as important as the writer of the lecture, who intrusts his work to them, and does not appear before the audience. The one man who appears to be doing the whole thing is the actor or declaimer. This is Karl Bergmann, who was an actor of good standing, but who regards his present position as an important promotion. With a voice of admirable clearness and flexibility, he declaims the lecture as if it were his own, turning confidentially to the audience, using such phrases as "my respected hearers," "I call your attention," etc. If the role which he plays seems in this description of it insignificant, it is not so in fact. Many good scientific lectures are spoiled by bad delivery. The Urania avoids that rock by choosing a man who is a master of the art of delivery.—*The Independent.*

Utilization of Fibers.

A new mode of treating hemp, jute, and other fibers for making materials for the manufacture of tiles, slabs, cisterns, boats, and other articles or structures has been described in a patent specification by B. A. Weatherdon. The fibers are cut and boiled four to six hours in a strong solution of lime by steam at a pressure of from 20 pounds to 40 pounds to the square inch. After being thoroughly washed, the material is passed to a pulping machine, where it is treated with alum, about 7 pounds to 14 pounds to the cwt., and in some cases with animal size, and in others with vegetable or other oils. From the pulping machine it is run into receiving or storing tanks, fitted for machinery for keeping the pulp in agitation, and while therein it can be dyed if required. Now, the pulp fiber is pumped into vats, and from thence into wire moulds, to be formed into slabs, blocks, etc., the liquor being extracted by suitable pressure. The slabs, blocks, etc., are brought into the drying room, and when dry passed through solid steel rollers four to twelve times, steeped in a warm solution of alum, and again subjected to hydraulic pressure. Then they are brought into a bath of vegetable or other oil for four to six hours, and again pressed and steam-rolled as many times as necessary. To finish the process they are dried in hot air, and in some cases passed through the rollers once more.

Toads in Rocks.

Many well authenticated stories of the finding of live toads and frogs in solid rock are on record, and that such things are possible was demonstrated here recently, when the workmen engaged in Varley & Everill's lime rock quarry, north of the city, broke open a large piece of rock which had been blasted out, and a frog hopped out of a pocket in the center of the stone, says the Salt Lake *Herald.* Of course, the occurrence created a tremendous sensation among the workmen, and operations at the quarry were for the time suspended, and the movements of the frog were watched with great interest. The animal was somewhat smaller than the ordinary frog, and was perfectly white. Its eyes were unusually large and very brilliant, but the frog was apparently blind. Where the mouth should have been there was only a line, and on the feet was a dark, horny substance. Mr. Everill at once took charge of the curiosity and put it in a tin can, but the frog died the next morning. He brought it down town, and it was examined with interest by a large number of people, and it was afterward presented to the museum, where it will be preserved in alcohol.

Artificial Sea Water.

Professor Edward Perrier lately communicated to the French Academy of Sciences the results of some experiments made by him at the zoological laboratory of the Saint Cloud normal school, upon the use of artificial sea water for the preservation of marine animals, and especially of oysters, in large aquariums.

The solutions employed have been reduced by him to the following formula for from 3 to 4 quarts:

Chloride of sodium	81 grms.
Sulphite of magnesia	7 "
Chloride of magnesium	10 "
Chloride of potassium	2 "

During the exposition, this solution gave as good results as natural sea water, with very much less expense.