Mortality among Elephants.

We learn from the Rangoon *Burmah Mail*, a file of which has just reached this office, of a large mortality among elephants in that district; and a more serious loss of the same kind has been experienced by the Moulmein foresters, on the Thoungyeen side. The *Mail* states the value of each elephant is from 800 rupees to 1,500 rupees ($400 to $750) and that the loss to their people in the aggregate is very considerable, greatly enhancing the price of these useful animals, and increasing the difficulty and cost of bringing timber to market.

KNIGHT'S IMPROVED HEALTH LIFT.

Physical culture, in moderation, is unquestionably beneficial; but physical culture in excess is as certainly baneful and injurious to the system. The present tendency is toward the extreme; and, as exemplified in the repeated failures of overtrained athletes at the moment of trial, the results reached are exactly the reverse of those sought. The reason is undoubtedly to be found in the mistaken theory which impels the development of only those muscles which are to be used in the contest—a theory which neglects the equally important truth that, after all, the human body is but a beautifully organized machine, and, like every other piece of mechanism, its ultimate strength, as a whole, is only equal to the strength in its weakest part. If, therefore, we create an abnormal growth of arm muscles for rowing, or for leg muscles for walking, we do so at the expense of some other part of the machinery, usually the nerve centers. We accelerate the circulation of the blood in the vessels of the chest until the walls of the veins and arteries become thinned and diseased through distension, and the application of undue strain determines their rupture. It would be exactly the same if we were to seek to strengthen an engine by taking away all the metal about the steam conduits until the walls of the same were as thin as paper, and putting it on the connecting rod and crank. The moment a heavy load was put on the machine, an increased strain would break the pipes, and everything would stop. The kind of exercise needed is that which will strengthen all parts of the body equally, producing a uniformly strong structure. Such exercise would be rational, beneficial, and health-giving, resulting in permanent good effects, and not, as is now too frequently the case, in permanent bad ones.

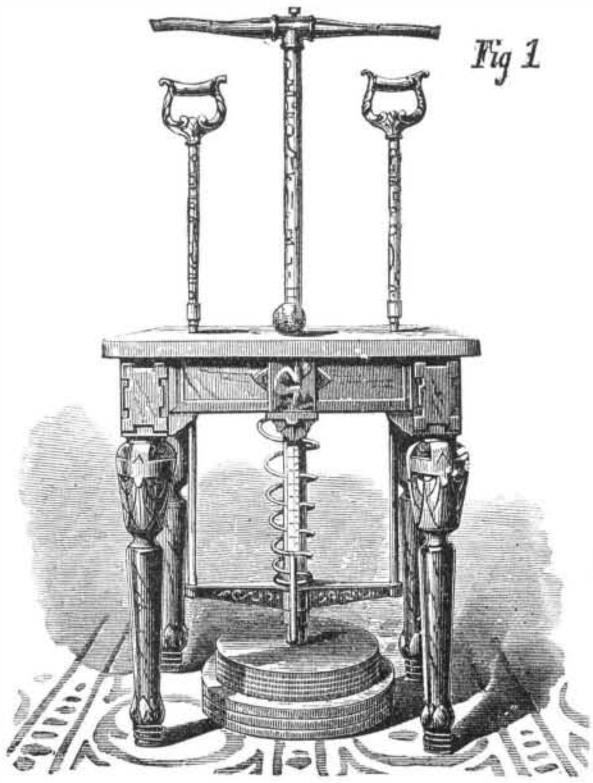


Fig 1

Whether or not such benefit is to be gained from what is known as the lifting system, we are not, from personal knowledge, prepared to state. That the lift exercise is growing in favor is undeniable, and we may add that we have known a number of persons who have derived much good therefrom. The inventor of the machines illustrated herewith, says, in regard to the value of lifting: "I state what I have proved; for in my practice of Swedish movements (applied exercise), I was compelled to devise some way to cultivate the strength and endurance of certain kinds of patients, without at the same time disproportionately taxing their nervous energies. My machine (in use six years in my office) does it better than anything else known to me; and I feel able to say that if oarsmen—*soi disant*, or professionals—would carefully cultivate the nerve centers by lifting in a prescribed manner everyday, they would accomplish more, and with less waste, than without the machine."

The appearance and construction of the machine referred to will be understood from the engravings. Fig. 1 represents the apparatus arranged for complete spring and dead weight combined, with a maximum resistance of from 600 to 1,200 lbs.; and Fig. 2 is the family machine, constructed with spring alone, having a resistance of from 300 to 600 lbs.

The table legs are supported upon springs, in order to give elasticity to the lift when raising a dead weight from the floor. A slotted tubular socket is attached to the under side of the table, and guides an interior tubular piston that is connected with a yoke sliding on the outside of the socket tube, and resting on a collar at the lower end of the same. A second pin connects the lower part of the sliding piston with a slotted and weighted tube which slides between the socket tube and piston, and which may be adjusted higher or lower on the latter, so that the weighted tube may be raised at any desired moment of lifting the piston. The yoke carries a powerful spiral spring which is compressed by raising the handle, and also side arms, having vertical rods and small side handles. The intermediate tube carries on its base collar a number of detachable weights which allow not only of the adjustment of the apparatus to any degree of spring and dead weight action combined, (but also by the higher or lower setting of the weighted tube) the raising of the weight at any desired moment after the spring has been partly compressed.

A well graduated strain is thus obtained, which proceeds from a minimum to a maximum, and thence goes back to the minimum, requiring no considerable effort to overcome the constant or fixed resistance, but admitting, by a gradually increasing exercise, a regular training and development of the muscles.

The machine is very handsomely constructed, and forms a neat and ornamental piece of furniture. Its employment is especially recommended to persons of sedentary habits and those suffering from chronic diseases.

Patented through the Scientific American Patent Agency, May 11, 1875.

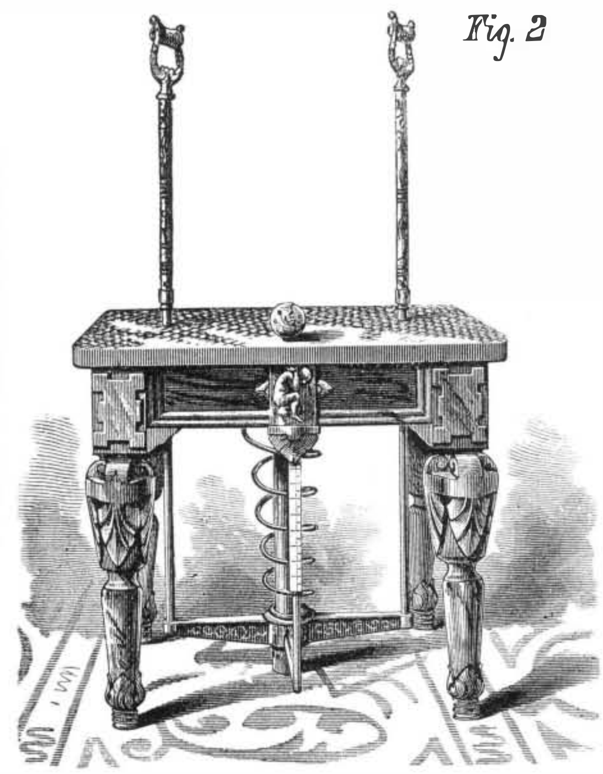
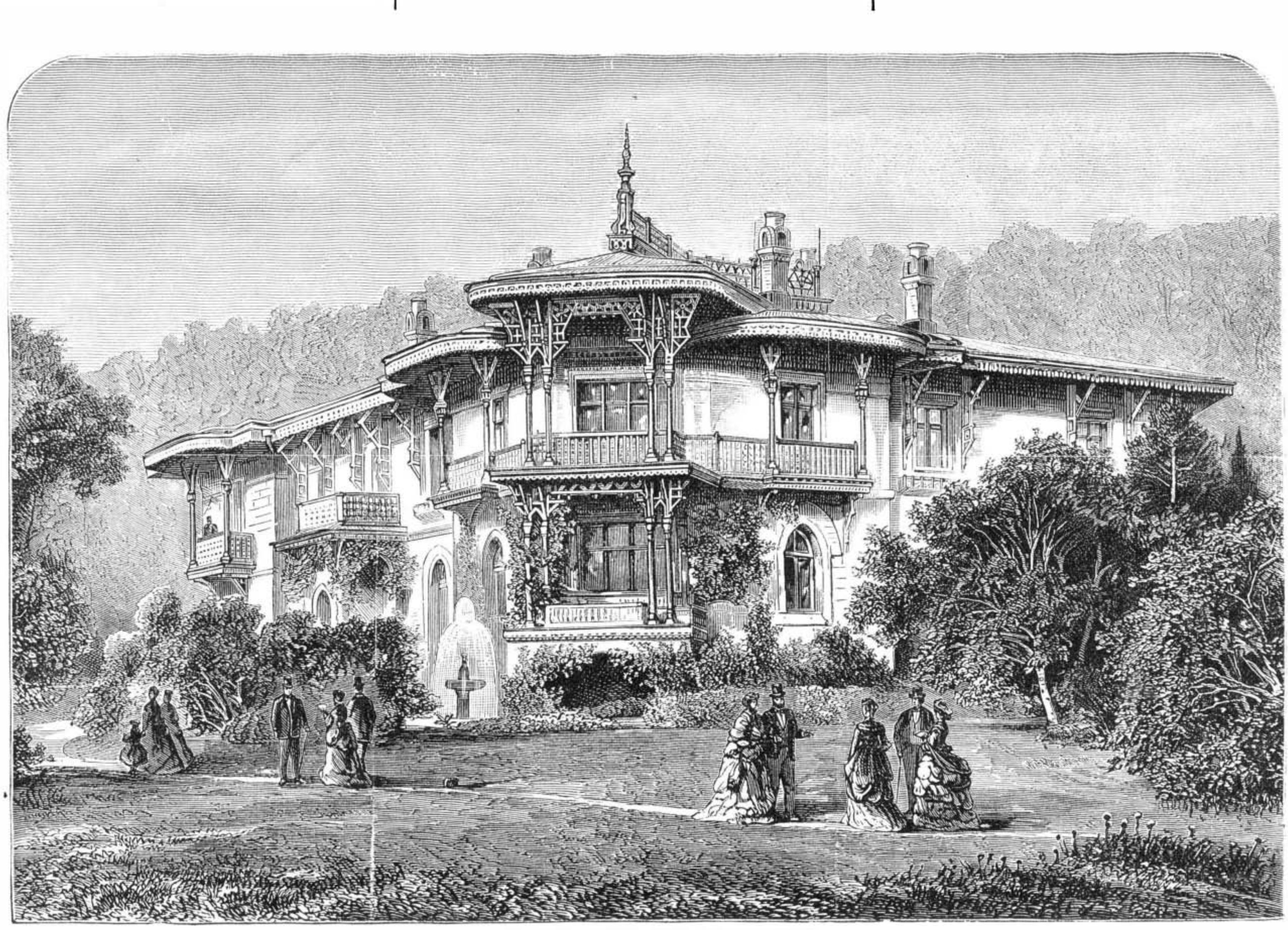


Fig. 2

For further particulars address the inventor Dr W. H Knight, 61 Pleasant street, Worcester, Mass.

A MODEL VILLA.

We have remarked of late a growing tendency on the part of architects and builders to abandon the stiff and ungainly models of rural architecture, and substitute therefor much more tasteful and ornate designs. There are few buildings so severely ugly as those of the conventional types so common in New England towns. We mean, first, the square box, the perfectly cubical shape of which is relieved only by a little cupola perched mathematically in the middle of the roof, looking as useless as it is out of place; second, the innumerable attempts to duplicate the Athenian Parthenon, by



A MODEL COUNTRY RESIDENCE

adding a series of ponderous and palpably wooden pillars to the front of the building, and thus darkening, by the overhanging roof, all the front windows of the upper stories; and lastly, the aspiring efforts to rival the modern French construction by imitating the iron and stone mansards and lofty towers, in wood and on a much reduced scale, too frequently in entire incongruity with all the surroundings. In constructing larger country dwellings, the same models, enlarged, have been kept in view, so that it is no uncommon sight to find the villa, standing in the midst of its score of acres, duplicated in the cottage, cramped in a twenty-five foot lot, or the cottage repeated on a magnified scale in the more pretentious residence.

So many excellent plans have been published for country homes that we are led to believe that a genuine taste has been awakened for a really rural style of architecture. A city house, with its lofty staircases and its general construction carried skyward, remains a city house, to all intents and purposes, no matter if planted in a wilderness. It suggests cramped space and narrow limits, and not that carelessness as regards the area covered over, which is the distinctive feature of the country dwelling. Let the reader compare the illustration of the beautiful villa, given herewith, with any of the perky, stiff, tall structures which sprang up like mushrooms when the taste for French design became first prevalent here. The edifice is low and broad, suggestive of ample halls and large, cool, airy rooms. It is irregular in shape, as if it were planned for the convenience of the occupants—adjusting itself to their needs, and not at all suggestive of that hermit crab peculiarity of many people who fix on a residence and then adjust themselves to it. There are broad windows shaded by tasteful porches, the heavy effect of which is relieved by the delicate half-Moorish tracery of their supports, and lastly, there are the piazzas, which fill out the details of the bare walls. Add tasteful painting, in a couple of cool shades of brown, for example, and the embowering westeria or other vines which trail over doors and windows, and a dwelling is made which is in itself a picture of comfort.

It is such architecture as this that we hope to see replace the designs so long prevalent. Taste, or rather the gratification of it, is not necessarily expensive; for it costs no more —perhaps not so much—to erect either a cottage or a villa which shall be graceful and pleasing in appearance, than to construct tall towers, and mansard roofs, and elaborate ornamentation, or even the severely plain edifices which, to our minds, serve only by their contrast to enhance the beauty of Nature's handiwork.

It would be an excellent plan, we think, for persons contemplating building to have models of their houses constructed in paper or thin wood. Few people can obtain a perfect idea of the aspect of any proposed edifice from the architect's drawings. Engineers very frequently adopt this plan in building bridges and similar structures; and in theaters, the scenic artist always submits pasteboard models of elaborate set scenes to the manager and playwright before putting brush to canvas. A good model is always preliminary to the construction of a machine—as indeed it is to almost every structure, except a building—and why architects should not also furnish an embodiment of their designs in the same manner has always seemed to us rather anomalous.

BRITISH ASSOCIATION NOTES.

PROPELLING SHIPS BY WAVE MOTION.

Mr. Beauchamp Tower read a paper on "A Machine for Obtaining Motive Power from the Motion of a Ship among Waves." The machine consists in principle of a weight supported on a spring, so that it can oscillate on the spring through a considerable range in a vertical line. The scale of the spring, and consequently the natural period of oscillation of the weight, can be varied at will. When it is so adjusted that it synchronises with the waves, the oscillations become very violent, and a large amount of power can be obtained from them. In practice, the springs consist of highly compressed air pressing on the rims of hydro-pneumatic cylinders, and the arrangement is such that the vessel containing the compressed air forms the moving weight. The author exhibited a design of a machine for working an auxiliary propeller of a sailing ship of 1,800 tuns displacement. The moving weight in this case is 200 tuns, and he showed by calculation that it would give about 30 horse power in the long swell met with in the tropical calms, 260 horse power in average ocean waves, and more than 600 horse power in a heavy head sea. The space occupied by the machine compares favorably with a steam engine of the same power. The author exhibited a model of the machine, which recently, in a moderate sea, had yielded power at the rate of $1\frac{1}{2}$ horse power per tun of moving weight.

WAVE MOTION

Professor Guthrie read a paper on the measurement of wave motion. He said his endeavor in various inquiries was to determine the rate of wave progress. The rate at which the wave moved along depended very little indeed upon the hight of the wave, nothing at all upon the breadth of the wave, nothing upon the density of specific gravity of the liquid, but almost entirely upon the wave length—that was, the distance from crest to crest. The learned professor demonstrated by means of experiments that, in circular troughs, the smaller the diameter the more rapid was the pulsation, and that the rate in different sized troughs varied inversely as the square root of the diameter. It was also found that in a circular trough a wave 39·4 inches in length traveled in one minute over 270 feet.

UNDERGROUND TEMPERATURE COMMITTEE.

Professor Everett presented the report of the Underground Temperature Committee. He said the committee had been in existence for eight years, and during that time had been engaged in trying to determine the rate of increase of temperature of the rock as they went deeper into the ground. The observations had generally been made by means of artesian wells and mines, and he gave interesting particular, of investigations recently made in the St. Gothard tunnels at Chiswick, and at Swinderly, near Lincoln. Mr. Galloway, mining engineer, narrated the result of some observations in mines in regard to the temperature, and Professor Everett said he did not think that in old mines, where good ventilation had been obtained for many years, any reliable data with reference to the temperature of the rock could be obtained without boring to a very great extent.

THE ATMOSPHERE AND SOUND.

Professor Osborne Reynolds read a paper on the refraction of sound by the atmosphere, and related the effect of experiments which he had recently made, with a view of throwing light on the subject. He had confirmed his hypothesis that, when sound proceeded in a direction contrary to that of the wind, it was not destroyed or stopped by the wind, but that it was lifted, and that at sufficiently high elevations it could be heard at as great distances as in other directions, or as when there was no wind. An upward diminution of temperature had been proved by M. Glaisher's balloon ascents, and he showed, by experiments with the sounds of firing of rockets and guns, that the upward variation of temperature had a great effect on the distance at which sounds could be heard. By other observations he found that, when the sky was cloudy and there was no dew, the sound could invariably be heard much farther with than against the wind; but that, when the sky was clear and there was a heavy dew, the sound could be heard as far against a light wind as with it. Professor Everett remarked that Professor Reynolds had given the most important contribution to the subject that had been given for very many years.

SUN SPOTS AND ATMOSPHERIC FORCES.

Professor Barrett read a paper prepared by Mr. T. Moffat, on the apparent connection between sun spots, atmospheric ozone, rain, and force of wind. The author stated that from 1850 to 1869 he discovered that the maximum and minimum of atmospheric ozone occurred in cycles of years. He had compared the number of new groups of sun spots, in each year of these cycles, with the quantity of ozone, and the results showed that in each cycle of maximum of ozone there was an increase in the number of new groups of sun spots. He also showed that there is an increase in the quantity of rain and the force of wind with the maximum quantity of ozone and sun spots, and a decrease in these with the minimum of ozone and sun spots.

CONSTITUTION OF THE SUN.

Professor Balfour Stewart, in an address on this subject, said: Several new metals have been added to the list of those previously detected in the solar atmosphere, and it is now certain that the vapors of hydrogen, potassium, sodium, rubidium, barium, strontium, calcium, magnesium, aluminum, iron, manganese, chromium, cobalt, nickel, titanium, lead, copper, cadmium, zinc, uranium, cerium, vanadium, and palladium occur in our luminary

If we have learned to be independent of total eclipses as far as the lower portions of the solar atmosphere are concerned, it must be confessed that as yet the upper portions—the outworks of the sun—can only be successfully approached on these rare and precious occasions. Thanks to the various government expeditions despatched by Great Britain, by the United States, and by several Continental nations—thanks, also, to the exertions of Lord Lindsay and other astronomers —we are in the possession of definite information regarding the solar corona.

In the first place, we are now absolutely certain that a large part of this appendage unmistakably belongs to our luminary, and in the next place, we know that it consists, in part at least, of an ignited gas giving a peculiar spectrum, which we have not yet been able to identify with that of any known element. The temptation is great to associate this spectrum with the presence of something lighter than hydrogen, of the nature of which we are yet totally ignorant.

A peculiar physical structure of the corona has likewise been suspected. On the whole, we may say that this is the least known, while it is perhaps the most interesting, region of solar research; most assuredly it is well worthy of further investigation.

THE TRIALS OF SCREW STEAMSHIPS.

Mr. William Denny (Dumbarton) read a paper on "The Trials of Screw Steamships." A considerable part of his paper was taken up in proving the fallacy of the cube of the speed theory, of which "arbitrary and misleading dogma" he hoped there would soon be an end. The system of progressive trials exploded this idea, and if the late Professor Rankine had had the advantage of progressive trials his work would have been more valuable. In making progressive trials, perfect accuracy should be obtained, and they would be worthless if they fell below Admiralty standard, which the majority of private trials, he was sorry to say, did almost invariably. A perfectly calm day was necessary, as the wind told enormously on the slow speed. The great aim was to equalize the development of power on the two runs. They would gain literally nothing from single model trials. Mr. Thorneycroft (Chiswick) having observed that, in a ship with a very large surface, the resistance increased in a slower ratio than in a bluff vessel, Professor Kennedy said that shipbuilders had not at present got anything like so far to adopting progressive trials as Mr. Denny seemed to have gone. But one thing they might at least look for was tolerably complete results. They continually had to work at results which looked very complete, and had a great many figures in them, but frequently happened to leave out one or two matters which were absolutely essential to coming to anything like conclusions from them. It was very easy indeed, on a trial ship, with a moderate amount of care, to get to know a great deal of the commoner particulars, which, if put together and collated, would help them to come to something like a conclusion. They wanted especially particulars of the size of the vessel, her general form, the exact draft, and the exact speed. Mr. W. Smith (London) agreed with Professor Kennedy in his remarks. He said that the very systematic mode of setting about to deceive had been too thoroughly followed, and had been a practice quite recognized in connection with steamship builders, marine engineers, and even the persons associated with them. It was impossible to conceive of anything more fallacious than the records that had been sent to the British Association on this matter. Mr. Denny heartily agreed with what Professor Kennedy and Mr. Smith had said, and added that he had seen glaringly careless trials, which were as bad as dishonest trials.

THE STEERING OF SCREW STEAMERS.

In a paper read before the mechanical section of the British Association, Professor Osborne Reynolds says: 1. That when the screw is going ahead, the steamer will turn as if she were going ahead, although she may have stern way on. 2. That when the screw is going reversed, the rudder will act as if the vessel were going astern, although she may be moving ahead. 3. That the more rapidly the boat is moving in the opposite direction to that in which the screw is acting to drive it, the more nearly will the two effects on the rudder neutralize each other, and the less powerful will be its action. In reference to the effect of the screw to turn the boat independently of the rudder, the author states the following law: 4. That, when not breaking the surface, the screw has no considerable tendency to turn the ship as long as the rudder is straight. On the subject of racing, the author stated that his experiments had enabled him to establish the following laws: 5. That when the screw is frothing the water, or only partially immersed, it will have a tendency to turn the stern in the opposite direction to that in which the tips of the lower blades are moving. 6. That when the boat is going ahead, its effects will be easily counteracted by the rudder; but when starting suddenly either forward or backward, at first the effect of the screw will be greater than that of the rudder, and the ship will go accordingly. 7. That if, when the boat is going fast ahead, the screw is reversed, at first it almost destroys the action of the rudder, what little effect it has being in the reverse direction to that in which it usually acts. If then the screw draws air or breaks the surface, it will exert a powerful influence to turn the ship.

New Photo Dry Process.

M. E. Quiquerez furnishes the details of his rapid dry process, which, he claims, combines the quality of results belonging to the albumen processes with a sensitiveness hitherto unapproached. The plates first receive a preliminary coating of albumen (one in forty) to be filtered immediately before use. M. Quiquerez insists upon the use of ammonia rather than acetic acid for preserving the albumen from decomposition, as the acid causes the growth of a species of fungus which destroys the clearness of the liquid. Any good commercial collodion may be used, but one containing a large proportion of bromide is to be preferred. The silver bath consists of: Nitrate of silver 40 to 50 grains, glacial acetic acid, $2\frac{1}{2}$ to 10 minims, according to temperature, rain water 1 oz., to be saturated with iodide of silver. The plate is allowed to remain in the bath at least four or five minutes, after which it is well washed, first in rain and then in ordinary water, until the whole of the free silver is removed. The preservative, in which the novelty of the process lies, is as follows:

SOLUTION NO. 1.—Roasted and finely ground coffee, $3\frac{3}{4}$ ozs.; Caramel, $1\frac{1}{2}$ ozs.; boiling rain water, 40 ozs.

SOLUTION NO. 2.—Gum arabic, 1 oz.; albumen (beaten and decanted), 1 oz.; pyrogallic acid, 120 grains; cold rain water, 26 ozs.

When No. 1 has become cold, it is filtered and added to No. 2, the whole being well agitated, when it is ready for use. M. Quiquerez attributes the great sensitiveness of this process to the large quantity of pyrogallic acid employed, the albumen, though present in very small proportion, giving great solidity to the sensitive film. The gum and caramel lessen a slight tendency to harshness noticeable with coffee and albumen alone, and also render the film more permeable during development. The pyrogallic acid facilitates the action of the alkaline developer. The preservative is applied in the usual way by pouring it on and off the plate (previously well drained) three or four times.

The development is performed in a dish, by means of a plain solution of carbonate of ammonia, the plate being plunged direct into the developer without previous washing. If the exposure has been well timed, the details will be brought out without further treatment, when the film is carefully washed and intensified with pyro and silver. If, on the contrary, the exposure has been too short, the development must be continued by means of the ordinary alkaline pyro developer. An eighty-grain solution of sulphocyanide of ammonium is recommended for fixing, as it does not destroy the half tones. The color of the image is a rich red brown: but for those who prefer a black tone, M. Quiquerez recommends the use of chloride of gold.