constitution. It is at least curious that several variable stars have been detected in the region of the great nebula, in *Orion;* that in 1860 a star suddenly shone out in the middle of the well-known nebula *Messier* 80 (about half-way between *Antares* and *Beta* in *Scorpio*) which vanished in a few days, and that, as first remarked by Sir John Herschel, all the temporary stars, without exception, having been situate in or near to the borders of the *Milky Way*—the star cluster or ring to which our system of sun and planets belongs. In the latter class are included the memorable star of B. C. 134, which led Hipparchus to form his catalogue of stars, and those which blazed forth in 1572 and 1604, in the times of Tycho Brahe and Kepler.

In concluding, I will venture to express the hope that some of the many amateur astronomers in this country who have provided themselves with telescopes of first-rate excellence, will keep a strict watch upon the remarkable pair of variables which I have briefly described in this communication. Continuity of observation is often most important, and can only be secured and that not always in the uncertainty of weather by a strong force of observers in different localities.

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

The great armies are now face to face and the clash of arms may any moment break upon the ear. We heartily wish that the nation might be spared the further effusion of blood that our erring fellow citizens would lay down their arms and return to their allegiance, and experience at once how readily our government and the loyal people would offer protection even to those who have been deceived by bad leaders to take up arms against constitutional authority. But such a result cannot be expected, and more battles must be fought and more blood be shed; therefore the sooner these great armies are pitted against each other in deadly strife the sooner may we look for a solution of the great national trouble. As we think of our country thus afflicted, which but a few months ago was the most prosperous on the globe, we are led to wonder more and more why a portion of our people could have become so thoroughly maddened as they now are.

At last accounts Gen. McClellan was within a few miles of Richmond, pushing forward to the attack with a commendable zeal and prudence, and it seems to be understood that the enemy will dispute the right of occupation with great desperation.

Gen. Halleck was within three miles of Corinth at last advices, cautiously approaching the foe. This General, like Gen. McClellan, is prudent and able, and knows that it will not do to rush pell mell upon the foe, but must approach cautiously and carefully, to guard against surprise. At the very hour that we now write half a million of men may be fighting. We contemplate such a struggle with horror, confident, however, that we shall triumph.

A GALLANT NAVAL EXPLOIT.

Wherever the armies of the United States have advanced it has usually found warm friends in the colored population, and, could all the events of the war be faithfully chronicled, it would appear that those people have furnished our officers with much valuable information, while it cannot be denied that they have often been used as spies against us.

Commodore Dupont reports a most gallant exploit on the part of eight negroes in the running out of Charleston harbor an armed vessel—the *Planter*—and surrendering her to the Federal blockading squadron. Commodore Dupont, in his report to the Secretary of the Navy, gives the following account of the matter: "At four in the morning, in the absence of the captain, who was on shore, she left her wharf, close to the government office and headquarters, with the Palmetto and Confederate flags flying—passed the successive forts, saluted as usual by blowing the steam whistle. After getting beyond the range of the last gun she hauled down the rebel flag and hoisted a white one. The *Onward* was the inside ship of the blockading squadron in the main channel, and was preparing to fire, when her commander made out the white flag. The armature of the steamer is a 32-pounder or pivot, and a fine 24-pounder howitzer. She has, beside, on her deck four other guns one a 7-inch rifled—which were to be taken on the morning of the escape to the new fort on the middle ground. One of the four belonged to Fort Sumter, and had been struck, in the rebel attack on the fort, on the muzzle. Robert Small, the intelligent slave and pilot of the boat, who performed this bold feat so skillfully, informed me of this fact, presuming it would be a matter of interest to us to have possession of this gun. This man, Robert Small, is superior to any who have come into our lines, intelligent as many of them have been. His information has been most interesting, and portions of it of the utmost importance."

GUNBOAT OPERATIONS ON THE JAMES RIVER.

The James River is now clear of obstruction to within seven or eight miles of Richmond. At that point there is a heavy battery mounted on a high bluff, and the river is temporarily closed to navigation by sunken vessels, piles, chains, &c. In a recent attempt of our iron-plated gunboats—the *Monitor* and *Galena*—to pass this point they were temporarily prevented by these obstacles.

It appears that an attempt was made by the gunboats to remove these obstructions, under a fatal fire from the fort, which was able to pour its shot with accuracy down upon them, while they could not reply with much effect. This fort can only be reached with mortars: but if the obstructions could be dragged out of the channel the gunboats might easily pass the fort and have the city of Richmond at their mercy. The *Galena* and *Monitor*—which alone could be effective at short range—could not elevate their guns sufficiently to be of service in reducing the battery. No land force accompanied the squadron, and hence, as the place is totally unfavorable for a naval attack, it could not be taken. The vulnerable part of iron-clad boats is their deck plating, which, being only one inch thick, is penetrable by the largest shot by a plunging fire from an elevated position. The wooden vessels were wholly incapable of assisting in the reduction of the fort. Unless the fort has been captured by this time it will probably impede the passage of our boats quite seriously, except it be flanked. The first shot of the enemy's gun rolled off the sides of the *Galena*, making only dents in her mail, but gradually, after five hous fighting, it was found that the steel pointed balls used by him were piercing her. Thirty shots struck her and lodged, while two went entirely through her, tumbling out on the other side. The *Monitor*, however, maintained her superior strength and invulnerability. The balls glanced harmless from her tower of strength and fell into the placid waters of the river. The small gunboat *Naugatuck*, fitted up by E. A. Stevens, of Hoboken, to illustrate in some degree the large battery which he is trying to complete, accompanied the expedition, and carried a single rifled gun—a 100-pounder Parrott. Shortly after being brought into action this gun burst, and the vessel was obliged to withdraw. It is expected that the attack will be speedily renewed by a more formidable force, including mortar boats, which can operate with more success upon such elevated points than can gunboats.

THE PRESIDENT ON GEN. HUNTER'S PROCLAMATION.

Gen. Hunter, commander of the department embracing South Carolina, Georgia and Florida, issued a proclamation on the 9th inst., declaring the slaves of those States forever free. The President has taken the matter in hand, and has declared Gen. Hunter's act null and void, and, in order that there may be no future interference with his authority on this point, the President announces the following to be his position: "I further make known, that whether it be competent for me, as Commander-in-Chief of the army and navy, to declare the slaves of any State or States free; and whether at any time, or in any case, it shall have become a necessity indispensable to the maintenance of the government to exercise such supposed power, are questions which, under my responsibility, I reserve to myself, and which I cannot feel justified in leaving to the decision of commanders in the field. These are totally different questions from those of police regulations in armies and camps."

We are glad to know that the President has finally entered his caveat as an admonition to all military commanders to attend strictly to their duties. Let them attack the enemy boldly and vigorously, and leave all questions of civil policy to be settled by the government. Some few of our generals have made fools of themselves by their silly and ridiculous proclamations, even before they were sure of holding the ground on which they stood.

PONTOON BRIDGES.

The Fredericksburgh correspondent of the Philadelphia *Inquirer* says:—"The pontoon bridge across the Rappahannock, at this place, is one of the greatest inventions of the age. The pieces are numbered, and together with the gutta-percha floats, are carried in wagons from stream to stream. The corps attached to the pontoon have become so perfect in their laying of the bridge that a stream, the width of the Rappahannock, can be crossed by the bridge in a few minutes. We have just witnessed some practice with another bridge than that already laid down, and the performance is really wonderful. The government is now repairing the railroad bridge over the Rappahannock, and in a few days the cars will be enabled to run from Aquia Creek into the city of Fredericksburg.

MILITARY TELEGRAPH CABLE SUCCESSFULLY LAID.

The submarine telegraph cable was successfully laid on the 19th inst., across the Chesapeake Bay, from Cherry Stone to Back River in Virginia, and the War Department is now in telegraphic communication with Fortress Monroe and Gen. McClellan's headquarters.

The cable, twenty five miles in length, is heavily armored with sixteen stout iron wires, arranged longitudinally, like the staves of a barrel around the insulating coat and conductor, and protecting them from all strain by any force short of what would be required to break the covering wires, the aggregate strength of which equals that of a ship's chain cable.

The longitudinal wires are hooped by a still heavier wire, wound spirally round them, which binds them together so that they form a strong but flexible tube of iron that effectually protects the conductor and the insulating coat. This is deemed a great improvement over the English system of spiral wire armor which was used in the Atlantic cable, and tended so strongly and incorrigibly to twist and kink.

At the time of laying the first temporary cable, there was no heavy cable in this country, or machinery for its expeditious manufacture. The experiment was made with such cable as could be extemporized at the moment, and which was constructed like the English cable, 370 miles in length, laid in the Black Sea, between Varna and Balaklava, during the Crimean war, and which worked so admirably for several months.

The temporary cable worked successfully, and most opportunely to relieve the public mind on the memorable Sunday of the battle between the *Monitor* and the *Merrimac*, but in a few days was dragged away by anchors, or otherwise broken—an accident not likely to happen to a cable of such immense strength as the new one.

The present cable was manufactured in New York, under the orders of Col. Anson Stager, Military Superintendent of United States Telegraphs, and was laid in four hours, under the supervision of Mr. Wm. H. Heiss, who also superintended its manufacture. A brake of novel construction was used to govern the paying out of the cable, and worked so admirably that it is thought it will overcome one of the greatest difficulties experienced in laying the Atlantic cable.

MISCELLANEOUS.

It is stated that the Scientific Board charged with the duty of examining into and reporting upon the merits and prospective advantages of the Stevens battery for harbor defence have made a very strong report against it.

Forty thousand pounds of powder have recently been removed from the hold of the steamship *Bermuda*, a prize steamer now lying in the port of Philadelphia.

The Vicksburgh *Extra* of the 9th inst. announces that cannonading had been heard from our vessel on the previous day at Tunica, which is about fifty miles above Baton Rouge. We shall probably soon hear of the arrival of our gunboats at Memphis.

THE *Great Eastern* arrived at this port on Saturday May 17th, after a prosperous voyage. She is again in trouble: the owners having refused to make any recognition of the services of Mr. Towle, in devising the steering apparatus by which she was saved in September last, that gentleman has commenced legal proceedings against her.

The "New American Cyclopedia."

This great work approaches completion. We have received from the publishers, D. Appleton & Co., Nos. 443 and 445 Broadway, the fourteenth volume, carrying the alphabet from REE to SPI. The following extracts will give a good idea of the manner in which the several subjects are treated :—

REGNAULT.

Henri Victor Regnault, a French physician and chemist, born in Aix la Chapelle, July 21, 1810. He holds the position of engineer-in-chief of mines, and director of the imperial manufactory of porcelain at Sèvres, and is also professor of physics at the college of France, and of chemistry in the polytechnic school. His attention has been devoted chiefly to heat in its combinations with matter, and he was the first to demonstrate that the latent heat of steam diminishes as the sensible heat increases, but in a slower proportion. He has also verified the law of Mariotte and Boyle on the compressibility of the gases. Accounts of his investigations on these subjects fill the twenty-first volume of the *Mémoires* of the French academy of sciences. Analogous researches on the specific heat of solids and liquids, on hygrometry, on the respiration of animals and kindred topics, have from time to time been published in the *Annales de chemie et de physique*. He is also the author of an elementary treatise on chemistry, translated into several European languages.

SADDUCEES.

The name of a Jewish sect. According to a Jewish tradition the name is derived from Tzadok, the reputed founder of the sect, who flourished in the early part of the third century B. C.; but Epiphanius derives it from the Hebrew word *tzaddik* (just), and says that the followers of the sect assumed this name, as they considered themselves preëminently as the just. Both these derivations are uncertain and doubtful. They appear in history for the first time under the Maccabean Jonathan, about 144 B. C. They acknowledged only the written law, and rejected the obligatory character of all traditions; they denied the existence of spirits and angels in general, and held that the soul dies with the body, and has to expect neither reward nor punishment after death; they also denied a special providence, and made all human actions solely dependent on the free will of men. The sect was never numerous, especially in comparison with the Pharisees, but highly influential, as it mostly recruited itself from the educated and wealthy classes. Toward the close of the distinct national existence of the Jews the Sadducees were formally excluded from Judaism, and gradually disappeared; but some of their principles were revived by the sect of Caraites. A valuable work on the Sadducees has been written by Grossmann, *De Philosophia Sadducæorum* (Leipsic, 1836).

SALTS.

Before the time of Lavoisier, the name of salt was applied by chemists to almost any solid, crystallizable, transparent and soluble body; but he first restricted its meaning by defining a salt as "a body formed by the combination of an acid with a base, in which the properties of both are more or less neutralized." This was a great advance, but when the acids containing hydrogen were afterward discovered, it was perceived that this definition excluded their salts, which consisted only of a metallic element, combined with chlorine, bromine, iodine, sulphur, &c., and to which common salt, the very type of the class, belonged. To these compounds Berzelius proposed to give the title of haloid salts. A further extension of meaning has since been given, by applying it to all combinations of two binary compounds having a common element. Thus the combination of chloride of gold with another chloride is called a chlorosalt, and a combination of two sulphurets a sulphosalt. The salts of the oxygenated bases may unite to form double salts, of which alum (double sulphate of alumina and potash) is an example. Combinations of oxygen salts with oxides or haloid salts also occur, as well as of oxides with haloid salts, producing oxychlorides, &c. Salts may be neutral, acid, or alkaline, according to the proportion between the acid and the base. The salts formed by any given acid with the protoxides, sesquioxides, &c., of the metals, generally crystallize in the same or closely allied forms, or sometimes an acid may have two or more forms in which its salts occur. As an acid often forms more than one combination with a base, in that case of course different forms are produced. This property, known as isomorphism, extends to the haloid and other salts. The list of salts has of late years been multiplied manifold by the discovery of immense numbers of organic salts, in which either the base or the acid, and frequently both, are replaced by compounds, often very complicated, of carbon, hydrogen, nitrogen, &c. Haloid organic salts also exist, chlorine, bromine, &c., being replaced by such compounds as cyanogen, and the analogy to inorganic salts is in every respect perfect.

SARDINE.

A small and well-known fish of the herring family, and genus *alosa* (Cuv) Itis regarded by Valenciennes and most ichthyologists as identical with the fish called pilchard on the coasts of Great Britain, though Cuvier made it distinct, giving it the specific name of *sardina*. On the former assumption no description is here necessary. Its flesh is very delicate. The fishery employs a great number of men and women on the coasts of Brittany, and to a less extent of Portugal. The vessels are generally of eight or ten tuns each, with a crew of six to ten; they go two or three leagues from land, and when they see fish spread their gill nets, scattering their bait, which consists of the eggs and flesh of fish, especially of the cod and mackerel, and sometimes salted fish and crustaceans. Some are salted on board, and the others are carried on shore, and either consumed fresh, or salted, or preserved in olive oil and melted butter for exportation; the tin cases in which they are packed are familiar to all. The larger fish are called *celans* in France, and pilchards in England; their shoals are preyed upon by codfish, and especially by porpoises. Fish of many other genera of the herring family are called sardines. In the East Indies species of *clupeonia*, *spratella*, *kowala* and *Dussumiera* (the last named belonging to the *erythrinidæ*) are placed on the table as sardines, and have a delicate flavor; in the West Indies *harengula clupeola* (Val.) is called the Spanish sardine, and *pellona Orbignyana* (Val.) in South America; many other species on our coast, if preserved in olive oil, would doubtless be as delicious as the European sardine.

SEED.

The regular perfect reproductive agent in phænogamous plants by which species and varieties are perpetuated. The center of fertile flowers contains a hollow organ called the ovary, and this covers a number of small excrescent growths composed of a delicate tissue, which are the ovules. After impregnation by means of the pollen these ovules rapidly increase in size and undergo many modification which end in the production of the seeds. Within each seed is the embryo or young plant, consisting of a radicle, plumule and cotyledons; and while developing itself, the membranes which surround it frequently store themselves with albumen or starchy matters to be used by the embryo while in the process of germination. In some species the cotyledons contain the albumen, and for the same purposes. The ripened seed is protected by several external envelopes called the testa, perisperm, or spermoderm, consisting of the hardened membranes which inclosed the ovule. A small eye or scar (*hilum*) upon the side of the seed indicates where the umbilical cord (*funiculus*) proceeding from the partition of the ovary (*placenta*) was attached to the seed. The funiculus in the nutmeg enlarges itself into the aril and envelopes the seed, forming the mace of commerce; in the spindle tree it enlarges into an investing brilliant-colored mantle or cloak. Seeds are smooth or rough, sculptured or embossed, marked by veins, depressions and elevations; and their testæ present much beauty in these particulars as well as in their colors and tints. They may be enveloped in fleecy substances, like the cotton, or bristly and hairy, or furnished with *alæ* or projections like wings, as in the *bignoniaceæ*. Many families of plants have small fruits or sorts of nuts so similar to seeds as to be ordinarily called by that name, but careful examination shows the presence of pericarpal coverings. In the *coniferæ* and *cycadaceæ*, however, neither the seed nor the ovule is ever invested with any coverings, and on these extraordinary exceptions Robert Brown founded excellent natural characters in these two orders.

The Pasha of Egypt will be among the visitors to the London Exhibition.

The Results of the Carbureting Process.

We find the following in the London *Engineer* :—

At the last meeting of the City Commission of Sewers, Deputy Lott moved that it be referred to the engineer and the medical officer to examine and report whether the light from the gas lamps in the public streets was increased or diminished by the carbureting process recently applied to them, and whether the light thrown upon the footways was not, as he submitted it was, obscured by the shadow of the boxes containing the material used in the process. In the course of a discussion on this subject. Mr. Haywood, engineer to the commission, read a letter addressed to him by Mr. Massey, secretary to the Great Central Gas Company, complaining that the Carbureting Company, in applying their process to public lamps within the city, were picking out a lamp here and there for the purpose, to the inconvenience of the company. Mr. Massey also stated that a few days ago, as the Carbureting Company's men were fitting one of their naphtha boxes to a lamp in Queenhithe it exploded. This, he added, was the third accident of the kind that had occurred within the last three weeks. The directors of the Great Central had directed him to call the most serious attention of the court to an instance of explosion in a bracket lamp in Harrow-alley. Had, he said, one of the numerous lamps fixed in the rear of the same premises ignited, instead of the lamp in question, the great probability was that, occurring as it did late in the night, the whole block of houses and buildings used as cattle sheds would have been burnt down. The owner of the property had made a communication as to the risk she was incurring, and expressing great fear and anxiety for the future.

Dr. Abraham said probably the accidents referred to, which were exceptional, were due to mismanagement, and therefore preventible. At all events they were not of a nature to induce the Commissioners to abandon the carbureting process, by which a great saving of money was being effected in the public lighting, and which, he believed, would be eventually adopted over the entire metropolis.

Mr. H. Lowman Taylor held that the saving of money was at the expense of light, for he had observed on a recent occasion, late at night, a sort of twilight gloom in places where the process was in use. Besides it was obvious that the boxes containing the naphtha, attached to the public lamps, threw shadows on the ground.

Dr. Abraham said it was well known, long before the carbureting process was adopted, that at advanced hours of the night there was always a paucity of gas, consequent upon the companies relaxing their pressure.

The subject, on the motion of Deputy Harrison was eventually referred to the General Purposes Committee for deliberate inquiry and report.

Webster's Great Dictionary.

We learn with much pleasure from the publishers, Messrs. G. & C. Merriam, Springfield, Mass., that the new pictorial edition of "Webster's Unabridged Dictionary" is having a very extended sale. Every school, every office, nay every dwelling, should be provided with it. It is the standard not only for spelling and definition, but also for correct pronunciation. The amount of general information which is also condensed within its pages is truly astonishing. In the course of a very extensive professional practice we have frequent necessity to seek out and apply the best technical terms and descriptions. Webster is our constant recourse, and we never consult him in vain. It is surprising to observe how replete the work is. As an educational medium this work enjoys a very high reputation. For the schools of New York State no less than ten thousand copies have been purchased, while in Massachusetts, Michigan, New Jersey and Wisconsin an equal number has been obtained, or one copy for almost every school. It is said that more than ten times as many copies of Webster are sold as of any other similar publication.

PLASTER OF PARIS IN SAFES.—It will be seen that our Troy correspondent attributes the general failure of safes at the Troy fire, to the substitution of other materials for plaster of Paris. We shall have something further to say on this important subject.

THE tax on dogs in the State of Massachusetts yielded in 1861, $17,972 65.

Improved Propeller.

The accompanying engravings illustrate a novel propeller, invented by Charles O'Hara, of London, England, designed particularly for vessels of very light draft. The propeller detached from its connections is shown in perspective in Fig. 4. It is of semi-cylindrical form, and operates by oscillating upon a vertical axis, being completely submerged in a recess formed to receive it at the stern of the boat, H, as shown in Fig. 3. The engraving represents a semi-circular shield, G, at the top of the propeller brought forward so as to complete the circle of the upper surface; this form is preferred by the inventor, but is not essential. The surface which strikes the water is fluted with vertical concave grooves as shown. The propeller is connected with a steam engine and, being vibrated through a few degrees, presses against the water first upon one side and then upon the other of its axis, and thus drives the vessel along.

In order to draw the vessel backward the propeller must have its plane side turned forward, and in order to permit this it is necessary to connect it with the engine by some peculiar devices. These are represented in Figs. 1 and 2.

The cogwheel, A, is secured rigidly to the upper end of the propeller shaft, and the arm, B, is fitted loosely upon the shaft over the wheel, A. A slide, C, rests upon the arm, B, and has a tooth attached to it which passes through a slot in the arm, and may enter any one of the spaces between the teeth of the wheel, A. It will be seen that by carrying the slide from the center, the tooth is drawn out from between the cogs of the wheel, A, and thus the wheel is disengaged from its connection with arm, B. Its position may now be reversed, and then by drawing back the tooth between the cogs the connection between the wheel and the arm, B, is renewed, and the propeller is again subjected to the power of the engine.

To facilitate the breaking and reforming of this connection, a lever, D, is secured over the slide with its fulcrum at *e*, and a post upon the opposite side of the wheel having a notch to hold the lever in place. The lever operates on the slide by means of two studs, *f* and *g*, attached to the slide and rising one upon each side of the lever. When it is desired to turn the vessel around, the propeller may be turned but one-fourth of a revolution on its axis and secured in that position, when it will operate to move the stern of the vessel directly to one side. The propeller may be hung upon a horizontal axis if desired when one-half only is to be submerged.

The following advantages are claimed for this propeller by the inventor :—

1st. Simplicity of its structure and cheapness in manufacture.

2d. Simplicity and cheapness of the kind of engine used in connection with it.

3d. Very direct action.

4th. No loss of power by lifting water or displacing it, as is the case with the paddle wheel or screw.

5th. Great reduction in the consumption of fuel.

6th. For floating batteries the propeller is totally submerged, and all the machinery may be placed under the water line.

Fig. 1

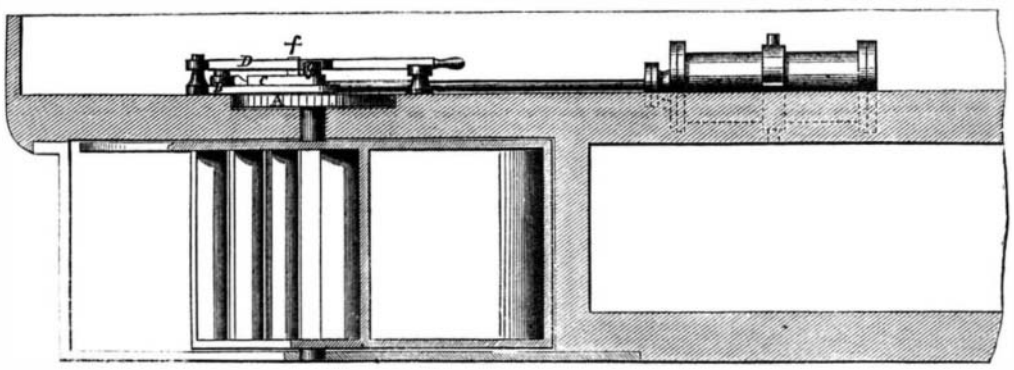
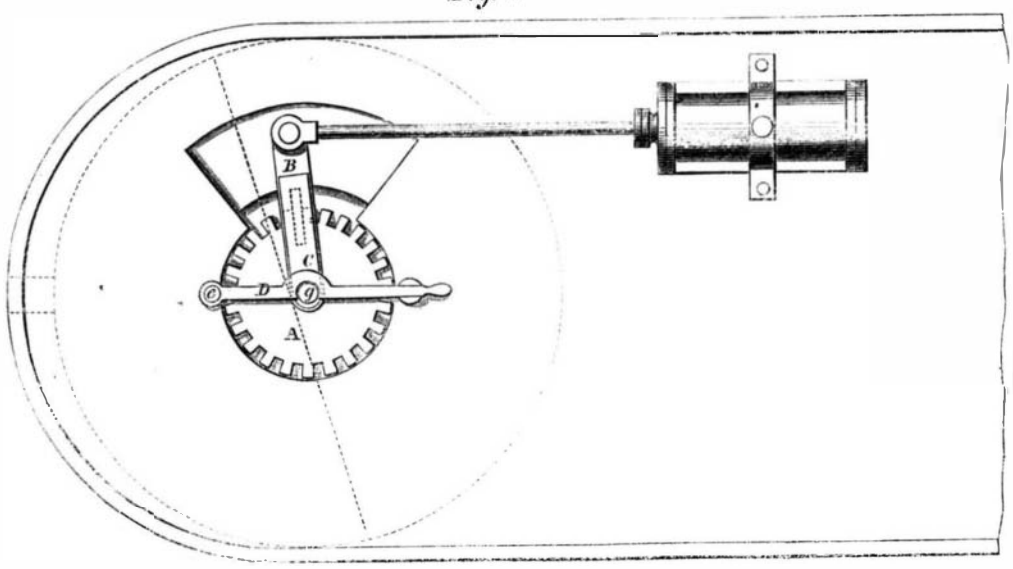


Fig. 2



O'HARA'S LIGHT-DRAFT PROPELLER.

Fig. 3

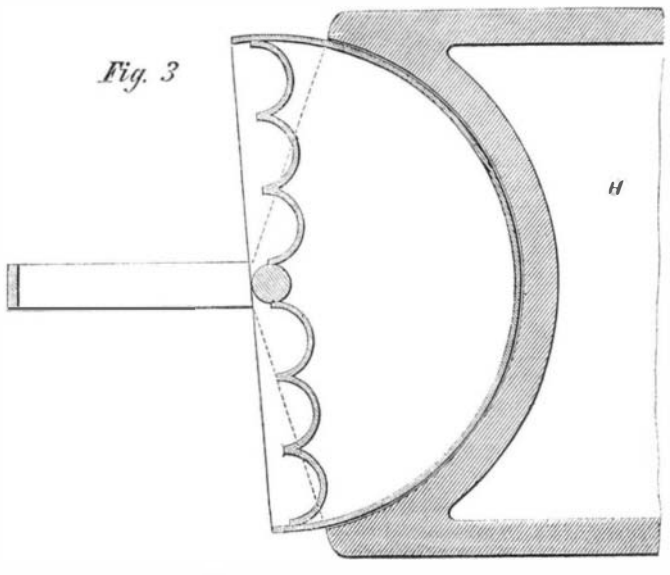
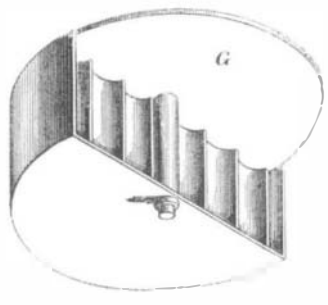


Fig. 4



7th. No surge is caused by it in canals to injure or wash their banks, and no rapid vibrations tending to injure the boat or its machinery.

8th. On the shortest notice the propeller may be placed in a position to so oscillate that the vessel can be instantly turned out of her course to the right or left, to back water or to turn the vessel rapidly round on its own center.

9th. No danger of the propeller being injured by "sawyers" or "planters" in river navigation, or by ice, or any foreign matter.

10th. Weeds in shallows cannot impede its action.

11th. It may be used with sails, so that during direct winds fuel may be economized.

The American patent for this invention was granted through the Scientific American Patent Agency, April 22, 1862, and further information in relation to it may be obtained by addressing the assignee, W. O'Hara, at Toronto, C. W.

Valuable Substitute for Metal.

The London *Artizan* says :—Adamas, as a substitute for metal in the manufacture of gas burners, has frequently been mentioned and it has also been stated that the same substance was equally applicable to various other purposes for which metal has been employed. The use of the adamas burners has recently become very general, and Mr. Leoni, the inventor and manufacturer of them, has now succeeded in introducing adamas taps and adamas machine bearings, the working of which has given the greatest satisfaction to those who have employed them. The mode of manufacture consists in reducing the silicate of magnesia to an impalpable powder, and then molding it into the desired form, and annealing it, the result being, that with the greatest facility the utmost precision may be obtained. When employed for taps the advantage is that an article is produced upon which neither heat nor acids have any effect, at a merely nominal price, and it is anticipated that at no distant period adamas steam cocks will come into general use, to which purpose the material is undoubtedly well adapted, since, on a trial of a couple of ordinary adamas beer taps (the price of which will be but 1*s.* or 1*s.* 3*d.* to the retail customer) the one began to leak at a pressure of 65 lbs. to the inch, and the other stood upwards of 80 lbs. without being affected. But the purpose to which the material may be considered as more especially applicable, is for the manufacture of machine bearings, the test which it has stood in this direction being certainly all that could be desired. A steel spindle was run in an adamas bearing for 100 entire days consecutively, at a speed of about 1,500 revolutions per minute, yet neither the spindle nor the bearing shows the slightest appearance of wear, and several other experimental tests have proved equally satisfactory. But as a single practical application is preferable to any amount of experimental testing, it may be stated that at the works of Mr. Grissell, the well-known engineer, a bearing has been for some time in use, and appears to succeed completely. They use it as a fan bearing as a substitute for a Babbitt's patent white metal bearing, brass having been previously proved to be quite inapplicable, owing to the great friction and resulting heat, and, although the shaft makes nearly 1,000 revolutions per minute, it is found that the adamas bearing remains quite cool, requires oiling but once a day, and shows no appreciable signs of wear. In the position in question the life of a Babbitt's bearing is five weeks, and it is confidently believed that the adamas will last far more than as many months.