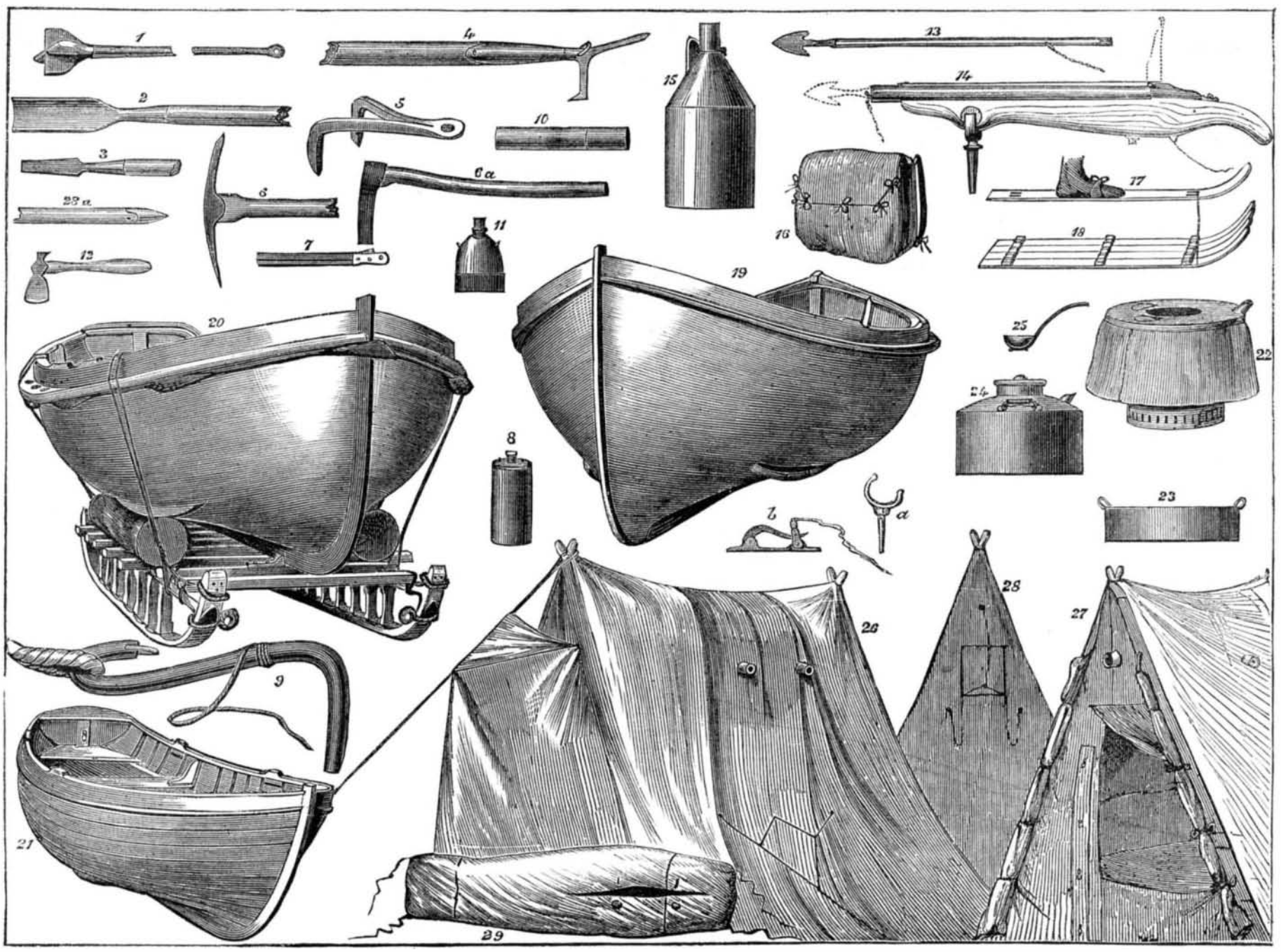
THE BRITISH ARCTIC EXPEDITION.

We have so recently given to our readers full accounts of the nature and purposes of the arctic expedition which has just sailed from England that no recapitulation is necessary in describing the engravings on this and the following page. The first is a portrait of the commander, Captain George Strong Nares, of the Alert, the leading vessel of the expedition. He entered the Royal Navy in 1845, having gained the annual naval cadetship given as a prize of merit to the boys of the Royal Naval School at New Cross. He served in the Canopus, in the Channel squadron, until 1848, when he joined the Havannah, and served three years in her on the Australian station. Having returned with his vessel to England, he was appointed mate of the Resolute, employed in the arctic expedition of 1852, under Sir Edward Belcher. With this ship he passed two winters in the ice. Upon the return of that expedition, he became gunnery lieutenant of the Glatton, an ironclad vessel of immense armament. He afterwards held a similar post in the Conqueror, under Admiral Sir Hastings Yelverton. When the present system of training naval cadets was instituted, Lieutenant Nares was placed in charge of those on board the Britannia, under the late Captain R. Harris. He held this appointment till promoted, in 1854, to the rank of commander. With that rank he served in the Boscawen training ship at Southampton, and in the Salamander and the Newport, surveying vessels. In the Newport, Commander Nares made a survey of the Gulf of Suez and of the entrance to the Suez Canal. He had made himself known to the public and to the profession as author of an excellent treatise on seamanship, including the fitting and rigging of ships, sailing, management of boats, etc. In December, 1869, Commander Nares was promoted to be captain, but retained command, in the Shearwater, of the Mediterranean survey. This he left in 1873, when appointed to command the Challenger in her voyage of scientific investigation round the world. Captain Nares took the Challenger, whose voyage of discovery has led to many important results which have been duly chronicled in our columns, to Australia and the Indian and South Pacific oceans; but when his ship reached Hong-Kong, early in this year, he was ordered home to take command of the arctic expedition.

CAPTAIN G. S. NARES.

Our next engraving contains accurate representations of the principal apparatus and appliances, most of which are new inventions, the result of experience gained in previous expeditions. The list is as follows:

1. Ice crusher, with leather handle, 5 feet 6 inches long; 2, ice gouge, 8 feet long; 3, ice chisel; 4, ice point; 5, ice drag; 6, pick-ax, weighing 6 lbs. 14 ozs.: 6A, ice ax, weighing 8 lbs.; 7, snow knife (in case); 8, blasting tin; 9, ice anchor, kept in four sizes; 10, dispatch tin, in different sizes, fitting one within another; 11, water bottle, with leather mouth and cup; 12, pemmican hatchet; 13, harpoon; 14, harpoon gun, the harpoon dotted in position; 15, rum can, with drinking cup fitted on top; 16, canvas knapsack, to be fitted over the shoulder by a strap; 17, snow shoe; 18, small sledge of four snow shoes lashed together; 19, whale boat, 25 feet long; *a*, row lock, *b*, catch for main sheet; 20, ice boat, 20 feet long; 21, punt, 12 feet long; 22, cooking apparatus, into which fits (23) the stew pan, and inside this fits (24) the kettle; 25, ladle for the same; 26, tent for eight men; 27, front of the tent; 28, back of the tent; 29, duffle sleeping bag. Most of these articles explain themselves, but special mention may be made of the ice tent (26), which is shown pitched, ready for use. It accommodates eight men, the officer lying furthest in, the men lying heads and heels, with the cook for the next day nearest the door, which it is his duty to make fast; and he lies here because it devolves on him to get up in the morning and prepare breakfast in advance of the rising of his comrades. It is the privilege of the man who has come off duty as cook to lie next the officer. The sleeping equipment for use in this tent consists of various strata. Next the ice is an india rubber sheet, covered with a thick robe of soft felting; on this the men lie in their sleeping bags of the same material, inside which they get, "all standing," for there is no undressing on sledge journeys; and over all there is another duffle robe. The cooking utensils (22. 23, 24, 25) pack into very



BOATS, TENTS, AND IMPLEMENTS FOR ARCTIC USE

small dimensions, the fuel used being stearine, spirits of wine, or tallow. The harpoon gun (13, 14) will be fastened on a swivel at the bow of a whale boat. Its length is four feet, and it is made of the finest steel. The gun, though single-barreled, has two nipples to the lock, to avoid the chance of a cap missing fire.

While traveling with the sledges, each man will be supplied with a water bottle, resembling an ordinary spirit flask in shape, but with the mouth and cup covered with a leather coating for the purpose of protecting the mouth from cold contact with the metal. The bottles will be replenished from the condensers, and the water will be kept in a fluid state from being carried in the bosom. The sledges will also carry a supply of rum of extra quality; but this will only be used in cases of emergency, as it has been ascertained that the best antidote against the polar temperature is not spirit, but oleaginous food, of which pemmican is a highly nutritious and concentrated form.

Our next illustration (Fig. 3) shows the form of sleigh specially designed for this expedition. It is intended to accommodate two officers and eight men, and to carry provisions for a journey of seven weeks. Above the sleigh are shown (1, 2, 3) a gage, chisel, and hooks for cutting through the ice.

Fig. 4 shows (1) the substantial sleigh intended to convey provisions, etc., to the depots to be established along the route. No. 2 is an ice drill, No. 3 a snow knife, No. 4 a grapnel or drag, No. 5 a snow shoe or skate, and No. 6 an ice anchor. In this engraving is also shown an ice saw and the manner of manipulating it.

Our next engraving (Fig. 5) exhibits sailing sleigh, intended for use when the wind is favorable; and the rigging is clearly shown. If these sleighs ever attain any such speed as is common on the Hudson river with ice boats, a very careful lookout will be necessary to prevent officers and men being engulfed in the fissures in the ice.

Each sledge will carry its cooking apparatus, shown in our sixth and last engraving. Where more is required, the apparatus will be of two kinds, one being formed entirely of metal, and the other being of wood, with an inner and outer

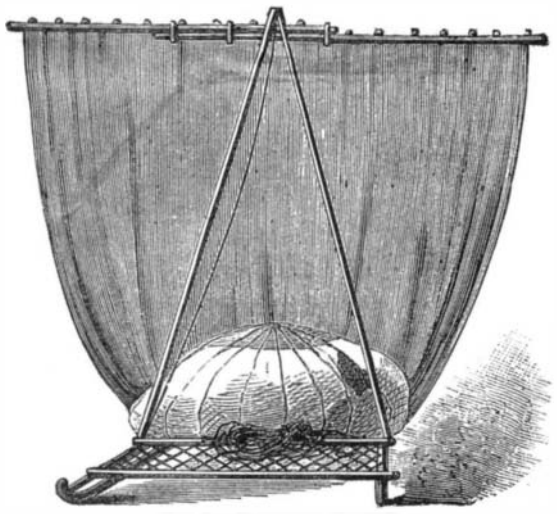


Fig. 5.—SAILING SLEIGH.

sheathing of tin, and having a receptacle on the top for condensing snow, which thus ensures a constant supply of potable water. The cooking stoves are circular, the heat being obtained by burning either spirit or stearine; and by an adjustment of saucepans, one upon the top of another, both pemmican and preserved potato or other condiment can be cooked at the same time. The whole is protected from the weather by an envelope of thick woolen cloth.

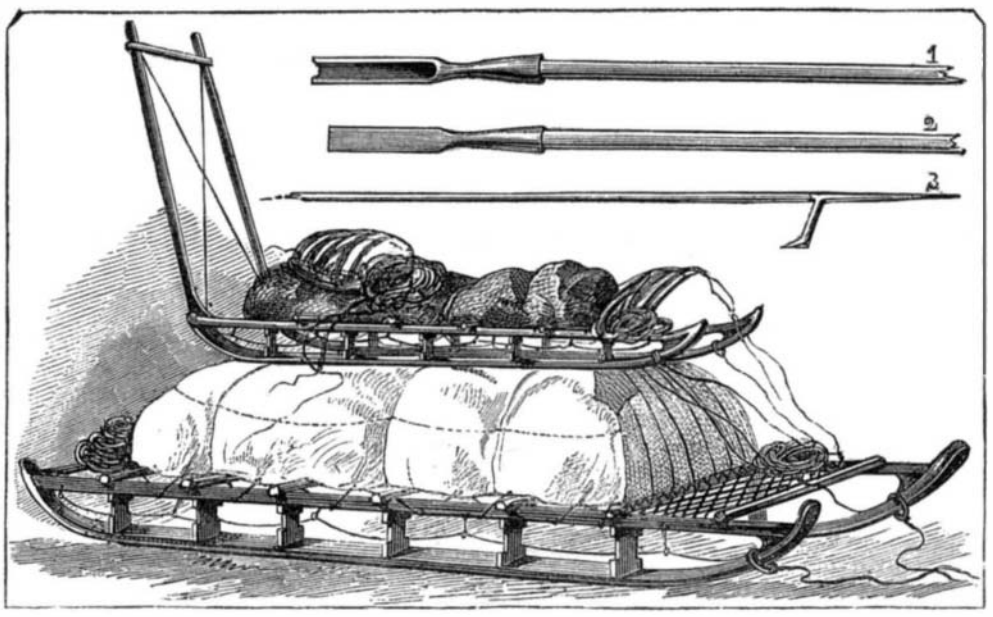


Fig. 3.—ARCTIC SLEIGH.

A New Lighting and Heating Gas.

It would appear as if a practical success has been attained in the process invented by Mr. T. S. C. Lowe, of Norristown, Pa. His method consists in producing, from anthracite and the decomposition of steam, a gas of very high heating power, and then enriching this by means of crude petroleum when the gas is to be used for illuminating purposes. The anthracite is charged in a small cupola of, say, 3½ feet in diameter, the bed of coal being kept from 3 to 4 feet deep. When fairly ignited, the base is closed, and superheated steam is admitted through tweers a short distance above the grate bars; the steam in contact with the burning coal is decomposed, and the gas produced is a mixture of hydrogen and carbonic oxide. The cost at which this excellent heating gas is produced is very small indeed, and its application in metallurgical processes and for domestic use offers many important advantages. Of course it is in this state entirely unsuited to illuminating purposes. To enrich it, a small jet of crude petroleum is directed on to the surface of the burning coal; the gases are thus mixed in the nascent state, and, to still further ensure their thorough mixture at a high temperature, they are passed through a chamber formed of fire brick, with small spaces between the bricks, heated in the manner of a Whitwell hot blast stove; this ensures a thorough mixture at an exceedingly high temperature.

The charge which has been used in some of the works using this process has been about 280 gallons crude petroleum and 3,600 lbs. anthracite for the production of 70,000 cubic feet of illuminating gas, the total cost amounting to 56 to 60 cents per 1,000 feet.

This promising improvement in gas-making has passed the stage of mere experiment, and appears to have entered that of practical success. Warned by the fate of several naphtha and petroleum processes brought out with many promises and small performance, the inventor of this process and his friends determined to thoroughly test this invention on a practical scale before giving it publicity. They erected their first gas works at Phœnixville, Pa., a place of some 10,000 inhabitants, and have since put it in operation at several small towns. It is, we understand, successfully working at each of these places, at Phœnixville having now, for eighteen months, lighted the town to the general satisfaction. The cold of the past two winters has affected this gas no more than, if as much as, ordinary coal gas, and, consequently, the fixedness of this product appears to be fully established.

To demonstrate the adaptability of the system to the lighting of large cities, works were established by arrangement with the Utica Gas Light Company, and we are informed that, for the past three months, the city of Utica has been lighted exclusively with gas made by this process; and we understand the Gas Light Company is so well satisfied with the results that it proposes to adopt it permanently. Not the least item of saving effected by this process is in labor. But two men—who are common laborers—are employed at the Utica works, and their time is but partially occupied; the addition of one more would suffice for a production of four times the present supply. The cost of the gas in the holder is claimed to be not over one half that by the old method, while the quality of the light is very satisfactory.—*Engineering and Mining Journal.*

Transits of Venus behind the Sun.

The observations of the transit of Venus made in various parts of the world last December have adduced, among other important data, one fact both novel and unexpected. This is that, with the powerful glasses with which the observers were provided, the disk of Venus appeared clearly defined in black upon the chromosphere which surrounds the sun before the first contact and after the last. Between the first and second contact and also between the third and fourth, while the edges of the sun and planet were apparently overlapped, the black disk of the latter not merely stood out in strong contrast on the white disk of the solar photosphere, but the outer portion of the planet was still plainly visible on the reddish background of the chromosphere. Moreover, when the black disk had entered to at least the distance of its radius on the solar surface, the exterior segment became surrounded with a thin luminous halo, supposed to be due to the refraction of solar light in the atmosphere of Venus.

The practical object in which the observation of the phenomenon may result is the rendering possible of observations of transits of Venus when the planet passes behind, as well as when it crosses before, the sun. For if the very weak reddish light of the chromosphere, which forms the corona about the sun, contrasts sensibly with the black of the planet in conjunction, the brilliancy of the planet in opposition and in full phase will afford even a greater contrast. It is true that the apparent diameter of Venus is nearly six times less in opposition than in conjunction; but it is certainly sufficient to render the planet visible as it crosses the chromosphere, and this even when a portion of the solar disk comes into the field of the telescope. The accuracy of the data obtained by these observations would be about six times less than that of observations similar to those of last December, owing to the greatly increased distance of the planet from the earth in the former case. But for the same reason, the passages behind would be more frequent, for they take place for oppositions six times further from the orbital node. This frequency, M. Philippe Breton (to whom the credit of the foregoing suggestions is due) thinks would compensate for the lack of accuracy; and he further points out that the comparison of observations of transits before and transits behind might add to the precision of the measures which we now possess of the elements of both sun and planet.

The next transit behind the sun will take place in 1878, and will be followed by four others at intervals of eight years, the last occurring in December, 1910. After that year, two centuries will elapse before another series of eight or nine passages will take place, among which series will be included two transits before the sun.

If, therefore, there be anything useful, which seems probable, to be gained by observing these back transits, preparations for the next one should not long be delayed. Four of the present series, those of 1846, 1854, 1862, and 1870, have already passed. They might have been utilized for perfecting the observations for the transit before the sun of 1874, just indeed as the one of 1878 may yet be with reference to the transit of 1882.

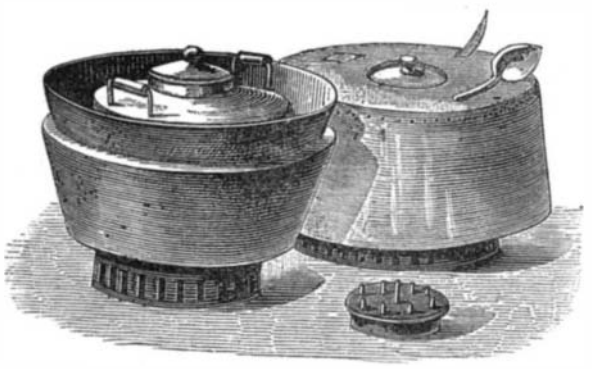


Fig. 6.—COOKING UTENSILS.

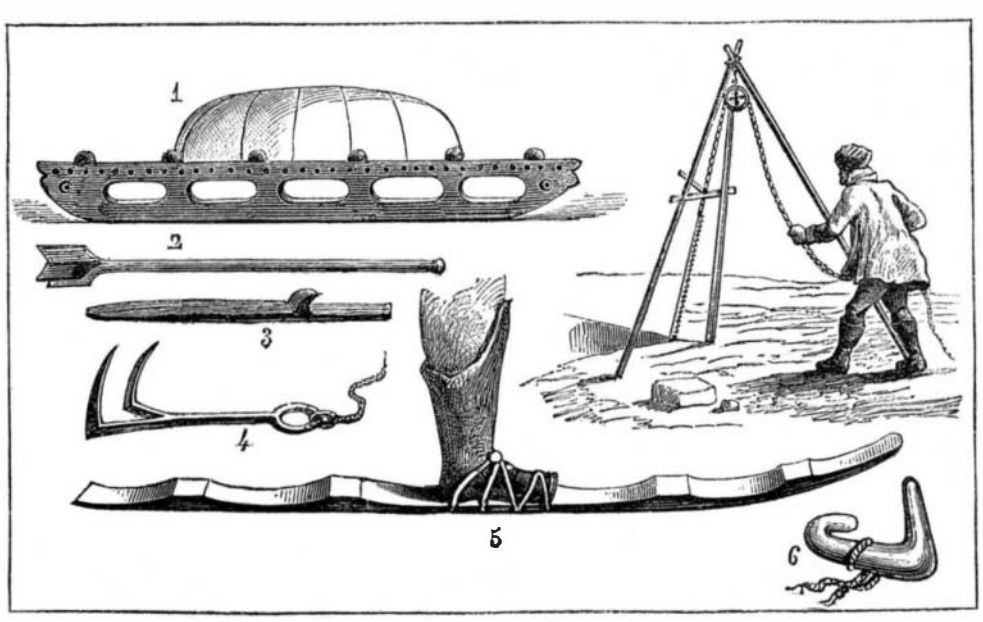


Fig. 4.—ARCTIC TOOLS, ETC.

Salicylic Acid.

In our paper for August 14, page 96, we gave an account of the chemical formation and nature of this excellent disinfectant. The following information concerning its uses is furnished by Dr. E, R. Squibb, of Brooklyn, N. Y.

"It is used for medical and surgical purposes, either dry or in solution. When used dry, it is sprinkled on to wounds, ulcers, or dressings in the form of very fine powder, in very small quantities, either simply powdered, or mixed in various proportions with some diluent, such as starch. When used in simple solution, either for spraying surfaces, or for washes or gargles, it is used in tepid solution of about 1 part to 300 parts of water. Where stronger solutions are required, for washes, gargles, or to moisten dressings, 1 part of the acid and 3 parts of phosphate of sodium to 50 parts of water have been used. When applied to wounds it appears immediately in the urine.

Its alleged advantages over all other antiseptics are: First, that it is far more powerful and effective in smaller quantities; and secondly, that it is, in all quantities necessary for complete effectiveness, entirely devoid of irritant action upon the living tissues. It is not caustic nor corrosive in any quantity, and never produces in-

flammation. In large quantities it may be irritant and painful, but yet rarely surpasses a stimulant effect, while it appears to be quite neutral in the very small quantities which are yet thoroughly effective; thirdly, it is said to reach and prevent processes of decomposition which are beyond the reach of all other antiseptics or anti-ferments. These processes are of two kinds, namely, vital, or those in which living organisms have an important part, such as that produced by yeast and many of those which occur in putrefaction; and chemical, or those which occur independent of vitality, as the production of the volatile oils in mustard and bitter almonds, the effect of diastase, etc. Now, while carbolic acid and other anti-ferments are azymotic, or completely arrest or prevent fermentations of the first kind, they are powerless with the chemical processes. Salicylic acid is said to be more effective with the vital ferments, and equally effective with the chemical.

Fourthly, in quantities said to be thoroughly effective, it is entirely odorless, and tasteless, and harmless, whilst it has no poisonous effect in any reasonable quantity.

It prevents or arrests the souring of worts, washes, and beers of the brewers, and prevents or arrests the putrefactive agencies which are so troublesome and destructive to the glue manufacturers; and these and similar trades have thus far seemed to be its principal consumers. Separate portions of fresh milk were set aside to become sour; one to which 0·04 per cent of salicylic acid was added soured thirty-six hours later than the other. Urine thus protected was on the third day still clear, and free from ammoniacal odor.

Professor Thiersch, of Leipsic, used it upon contused and incised wounds, and in operations, with excellent general results, destroying the fetid odor of cancerous surfaces and pyæmic ulcerations. To such uses this writer would add the suggestion that, for washing out the cavities of the abdomen and chest after those operations which tend so strongly to septicæmia, solutions of salicylic acid would seem to offer very great advantages, should it prove to be as bland and unirritating as it is stated to be, and yet so effective.

Most of these statements are summed up from the periodical literature of continental Europe during the past six months, little having appeared upon the subject in Great Britain, or in this country, and nothing having been done with it so far as known in either country.

If the medical art is to keep pace with the progress of the physical sciences, physicians cannot afford to pass by such articles as salicylic and benzoic acids when offered by chemistry, without investigating their effects upon disease, even though not one out of ten should repay the labor of investigation; for it is certainly in this direction of research that medicine must look with greatest hope of success to control those abnormal vital processes which so far may be modified, but not stopped.

The phenols, especially the so-called carbolic and cresylic acids (phenol and cresol), were, and must always remain to be, most important additions to this class of agents, surpassing in power all that had been previously tried. And if now salicylic acid shall prove more potent than the phenols, the further gain will be very great, and the research will again lead up toward future discoveries of still greater power."

Correspondence.

On a Mechanical Theory of Cosmical Motion.

To the Editor of the Scientific American:

As all attempts hitherto made to frame a satisfactory mechanical theory of the motion of cosmical bodies have resulted in total failure, and as the constancy of motive energy, as well as the aberration of light, show that both the ether and dense bodies are relatively unaffected by the movements of the latter, a reconsideration of the condition of both is demanded. The problem, it is plain, is to find a non-resisting physical cause of balanced motion, the idea of action at a distance being dispensed with. It is fully conceded, from the very fact of our previous inability to explain such motion, that some great and uncommon assumptions are necessary; and this has not only been acknowledged, but acted upon.

As a matter of fact, we observe in Nature the resolution of all cosmical bodies into systems of couples, in which each one of the couple moves in the inverse ratio of mass and distance round the axis of revolution, the force of motion being as the sum of the masses, and inversely as the distance of each from the axis. Such axis may form one of another couple, as in that of planet and satellite revolving round the sun. We are thus furnished by Nature with whatever fixed units we choose to agree upon as giving the relation of masses, distances, and force of motion, such designated units being physical constants. The whole Universe being composed of cosmical couples also argues physical connection.

Now the history of Science has shown that the test of a physical theory should be its power to consistently explain all the phenomena which it can ever be expected to cover, the greatness of the assumption not detracting from its value, providing that its rejection leads to inconsistencies and incompatibility with known facts and principles. In this case, also, it should, upon strict dynamical principles, be impossible to result in any other mode of motion than that observed in Nature. The following, I undertake to show, answers these requirements:

All ponderable matter is the condensation of an elastic ether, the mutual conversion into each other being continuous.

Of course, this transmutation is identified with a physical energy unalterable in amount, the actual and potential energies being equivalent in alternate change. Indeed, the opinion now generally entertained by the highest authorities in Science is that dense matter is, in some way, "a knot or coagulation of the ether." The amount of gross matter is, so far as we know, persistent. This, however, does not preclude dissolution into the ether again, providing condensation is equal. The continuity of transmutation finds an analogy in physiological action, in which matter, assimilated, takes on the constituted quality of the body of which it forms a part, having received it from the matter emitted. We know from the laws of light that the ether permeates all dense matter, and that it is denser in dense bodies than in the fluids. Also that force does not exist apart from matter; and still that all forces (except gravity) are convertible, their activity constantly equable, and exhibiting, throughout their most rapid transformations, a mechanical equivalence. The minimum limit of time occupied by molecular movement may parallel the time occupied in molecular transmutation; for we can set no possible limits to either. The mutual conversion of ponderable and imponderable matter thus violates no known law of Nature, and the totality of transmutation may be practically infinitesimal as regards time, the ether supposed to bein a condition of indifferent equilibrium towards the constitutive forces of matter, and the constant changes in Nature being due to such transmutation.

I look upon the ether as continuous, as shown by its nonretentfon of heat, but principally because I am unwilling to consider the isolation and repulsion of every atom as constituting the dynamic bond of the Universe. As a matter of fact, no part of the Universe can be isolated from the rest, and we are therefore more than justified in affirming that the all-permeating ether resists all breach of continuity; besides, we have the advantage of only applying mathematical quantities to substance. Now, it is evident that we can have perfectly unconstrained motion and absolute material continuity, if we assume translatory motion to be a progressive mutual conversion of ether and dense matter, analogous to the transmutation of forces, and in no other way. The only resistance thus offered by the ether is towards a break in its continuity, and therefore its condensation into gross matter produces a tension within itself, the stress being directed towards the center of the condensed mass. The same tension is constantly becoming loosened, however, by the condensed matter becoming rarified in the return transmutation into ether. A moving body of constant mass is thus substantially a moving equable strain in the ether.

All motion of translation will necessarily be as enforced by a stress in the ether, bodies being non-resistent in free space. It follows that, in an equally stressed ether, there would be no motion originated. Nor yet could there be stable motionless equilibrium, if but one mass would move; for the motion of all would be towards the balance of stresses. The ethereal strains will thus necessarily be, by theory as by fact, towards each particle taken by itself, and the centers of dense masses taken as wholes, giving any body in which the particles are free to move a tendency to assume the spherical form; but if supposed alone in space, without any tendency to move as a whole. With two bodies the case is different. The mutual tensions produced in the ether by the respective masses cause a compression towards each other, the force of which is greater as the distance is less. But if at any time lateral impulsion, sufficient to overcome the tension, be admitted, the strain being constant and the impulse temporary, they ultimately become equilibrated and form a constant couple, revolving round the center where both bodies balance according to the simple principle of leverage. As tension or pressure, when meeting with insufficient resistance, acts dynamically, and statically when resistance is equal and opposite, the condensing pressure of the ether, which is physically the centripetal force, enforces approach in bodies free to move; but an angular motion, when the stains are equilibrated, offers a constant resistance without expenditure in work, by the loosening tensions being equal in amount to those formed, and they become merely a line of connection, along which each body acts reciprocally as driver and follower. Any number of bodies, then, each of which creates a tension in the medium connecting them, and yet offers no resistance to the constant ethereal pressure, will all move until the tensions are equilibrated; if towards each other, with accelerated motion; and if resolved into couples, will continue in such coupled motions—a conservative system of parallel forces.

Although there is nothing positively known respecting the origin of cosmic systems, it appears most likely that they develope from vast vortices produced in a nebulous mass: electrical action giving the first mechanical impulse, from which they ultimately settle down into static systems of moving bodies: as the dust in the whirlwind, produced by electrical force, settles at length in the place where gravity gives it position. The observed variations from the general plane of balanced motion, and retrograde movements within the solar system, would seem to show that mechanical action has not been alone operative; possibly the same force which primarily evolved the nebulæ from the ether, impressing the conditions of motion and position. That the molecular condition of bodies, as altered by a transmutation in the correlated forces, will modify the conditions of mass motion, while the gravitation tensions which are towards the center of bodies remain constant, conflicts with neither theory nor observation. The disintegration, direction, or eccentric orbit of a comet is no more inconsistent with the balanced mass motion of dense bodies, in the system of which it forms a part, than a gunpowder explosion, so long as it moves to or from a center of force. The mechanical conditions of a conservative system, as a final result from theory, is that it forms one vast couple, unchangeable by any local interaction of its component parts the greater masses, by their greater moments of inertia, deviating, in general, least from the plane and circular curve of coupled motion.

All bodies, by thus stressing the ether, enforce motion in all others; and as all move unresistingly, it follows that the enforcement to motion of all at a like distance, by the same stress, will be the same whatever the masses enforced: the power, however, being always directly as the masses enforcing. The energy of tension is therefore invariable, whatever diversity there may be in the number of bodies enforced to move, or additional motion produced by the disintegration of a body itself. Nor can intervening bodies cut off the effect, being themselves unresistingly enforced, and adding their own enforcement. Theory and observation thus coincide.

The intensity of stress in the ether necessarily bears a definite relation to the cube of the distance, being greater as the condensed mass is greater, and manifesting itself independently of time. The motive force thereby induced is therefore as the joint mass of a couple. And as the force of motion is as the time of moving squared, so the time squared will diminish as the cube of any assignable distance, rendering the amount of motive force during one revolution for any equal couple invariable, however far apart. Thus every mass of matter in the Universe, equal to one cubic mile of the average density of the earth, enforces a motion in all others; and would enforce a motion of its own particles, if disintegrated, sufficient to produce revolution round a sphere of ether of one mile radius in about 173 minutes: the space being divided among the disintegrated fragments, and multiplied by the additional bodies.

It will be evident that, with this mode of conceiving of the ether and ponderable matter, there is nothing that conflicts with the mode of action of the radiant forces. The ethereal medium by resisting equably all breach of continuity, is substantially an isotropic solid, and all particles of gross matter, centers of spheres of tension. Waves of vibration will thus naturally run transversal to the direction of propagation to all distances. All possible loss of radiant kinetic energy, by friction in interstellar space, may become potential in the transmutation of ether into dense matter. For the structural qualities of the various elements will, in the return transmutation into ether, impress upon it their characteristic motions, which will travel onwards until their energy is absorbed by ethereal friction, or taken up by the similar elements of other ponderable matter. The radiant forces possessing a well defined amount of mechanical energy would seem to necessitate the constitutive qualities of every portion to be constantly modifying the constitutive qualities of each other; although only material atoms in indifferent equilibrium as to motion, as on a photographic plate, or bodies of similar constitution, may palpably manifest it. Optical phenomena show the ether to be in a condition of indifferent equilibrium as to form of motion; and it is not unreasonable to look upon it as being so in regard to constitutive charge. Electro-magnetic induction and polarity appear more intelligible in the light of the stressed connection of every particle of matter, with the equal and opposite flow within the stress of tightening and loosening tensions. As there can be no translatory motion in the ether, save in those portions condensing, a constant of aberration necessarily follows. But as the modes of change into ether are as various as the constitution and conditions of ponderable matter, we may have an infinite diversity in the lengths, directions, and velocities of ethereal vibrations.

Should the above theory meet with general acceptance, not only will the dispute between the advocates of action at a distance and those of action by contact have become ended, but a necessary Creative Power, in constant activity, will be seen to be consistent with laws of evolution through a persistent physical force: views hitherto deemed irreconcileable.

Philadelphia, Pa. WILLIAM DENOVAN.

The Grasshopper Plague.

To the Editor of the Scientific American:

In your issue of July 7 there is a paragraph in relation to the late invasion of grasshoppers; it contains a suggestion that said invasion may prove a blessing instead of a curse.

The phenomenon of a new variety of grass springing up in the localities lately infested with these insects is not as surprising as one may be led to suppose. A fact not generally known, but nevertheless quite worthy of attention, is that about three quarters of the newly born grasshoppers die while changing their skin, from the effects of cool rains, heavy winds, or otherwise; these, together with the excrements or *detritus* of the grasshoppers, are the very best reinvigorator of withered or exhausted grass roots; consequently the extraordinary growth of luxuriant grass can be attributed to the nourishing deposits made by these insects.

I cannot positively assert that the grass spoken of in your article is the same variety as that which came under my observation in Southern Russia, under the same circumstances, but I should be very much surprised if it were not. That which I examined grew in spots where no grass suitable for pasture had been previously known to grow; it was tender and very sweet, so much so that 6 per cent saccharin matter was extracted from it. It was of a bright emerald green, and cattle ate it with avidity; it was called by the inhabitants *solodycia* or sweet grass. It continued to grow for 3 or 4 years, decreasing in richness each season, until it became coarse, insipid, and dry, and totally unfit for grazing. And more wonderful still, it was the facsimile of the grass which formerly grew in these places. I therefore conclude that both grasses, the rich and the poor, come from the same roots, and not from seeds of another country brought by grasshoppers. The grass losing its richness is explained by the exhaustion of the soil, which is replenished by the grasshopper manure. G. PROSPER ZALESKI.

New York city.