The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Three Dollars per annum—One Dollar in advance, for four months.
Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling agents employed.

VOL. IX, NO. 4...[NEW SERIES].....*Nineteenth Year.*

NEW YORK, SATURDAY, JULY 25, 1863.

ARMY BREAD---HEALTH OF SOLDIERS.

Our soldiers, when in active field-service, we have been informed, are subject to dyspepsia and dysentery. When affected with either of these diseases, even for a limited time, a soldier becomes feeble and unfit for duty. The causes and prevention of these maladies should form a subject of earnest inquiry. A person with whom we recently conversed, who has had two years' experience in the army of the Potomac, and who had been a prisoner for some time in Richmond, stated that when our soldiers were fed for several weeks on "hard tack" (the name for army biscuit) and pork, their stomachs became disordered and dysentery followed. He stated that although food was less abundant in the secession army, the men were very healthy, and he attributed this condition to the use of fresh flour as part of the rations of the secession soldiers. For want of bakeries in the South to manufacture biscuit, flour and corn meal were served out to the soldiers, and they were accustomed to make cakes in camp and bake them on griddles—sometimes formed of flat stones. Another person of considerable experience in the army, with whom we have conversed, confirmed the statement as to the frequency of dyspepsia and dysentery in the army, stating his belief that these diseases were due, in a great measure, to inferior bread. He asserted also that the contract taken for this month to provide this bread was as low as 3.94 cents per pound, including boxing, &c., all ready for delivery. Thus the contract calls for bread to be made of *extra State flour*, which, at the rate of $5 80 per barrel, will yield 180 pounds of bread if thoroughly baked, for which $7 10 is the sum that will be received from the Government. Our informant states that it will cost for the flour, packing, and boxing, not including the expenses of baking, $7 77. He therefore concludes that an inferior quality of flour must be used in making the army bread, and that it is not sufficiently baked—a considerable amount of moisture being left in it. He also states that this bread is baked in ovens heated with the products of combustion which pass from the furnaces through perforated flues direct into the ovens. In other words, the bread is baked in a heated atmosphere of carbonic oxide and acid gases. The opinion was given that the bread thus baked absorbed carbonic acid gas, and was thus rendered injurious to the stomachs of the soldiers, tending to "poison their systems." We are also told that it is very difficult to heal the wounds of our soldiers in hospitals, which fact is attributed to the use of unwholesome bread.

We are aware that while carbonic acid gas is poison to the lungs, it is not injurious to the system when taken into the stomach in moderate quantities. It does not, therefore, seem to us probable that the gas in the bread baked as stated can be the cause of the diseases in our army. That the evils stated do exist in our army to some extent there can be no doubt, but we believe that they have been greatly exaggerated. We have directed attention to the hard army bread as the possible cause of such diseases; this is the opinion of persons who have had opportunities for extended observation in the army. They may be mistaken in their conclusions, but whatever may be the causes of these maladies they deserve investigation, and they should be removed if it is in the power of man to do it. Our soldiers who have gone forth to peril their lives for the support and perpetuation of the Government, deserve to receive the best food that can be provided.

CONSERVATISM AMONG MECHANICS.

Tradition is a good thing in its way, but mere blind reliance upon it sometimes leads men astray. The teachings of the past, applied to the arts, form what is termed experience, and by recalling to mind exigencies where extraordinary means have been employed to overcome difficulties, men perform duties with more ease and certainty than if they had not such memory at their service. The reader may ask, "Suppose a man has not had extensive experience in some branches of his business, how shall he thus familiarize himself with them?" We answer, inform himself by taking advantage of every means within reach that lead to the desired end. Conversations with practical men; consultations with books or papers devoted to the specialty he wishes to become acquainted with; these have an important influence which cannot fail to be an advantage to the student.

The mechanical ideas of this age of the world lead men ever onward; that is to say, that every hour discloses some vital question on which the masses of mechanics are ignorant because they have never given attention to the subject; as, for instance, the most impenetrable armor; the most deadly gun, rifled or smooth bore; the best forms for the hulls of batteries and iron-clad ships; and countless other points which will suggest themselves to all. This is why we say the spirit of the age leads ever onward, and hence the necessity which exists for investigating the labors of those who have preceded us. Is it not palpable to every one that the individual who has a knowledge of three or four different processes of doing the same thing, is a far more valuable member of society than he who adheres obstinately to his old-time method in the firm conviction that *it* alone is worthy of attention? Most undoubtedly. Yet we go over workshops and see men at work with tools that the best authorities have discarded long ago as useless, and have superseded them by more efficient ones; we see lathes in use with narrow shears, small spindles, light screws; planers with chains instead of screws or racks, and pinions, chain-feed on the lathes aforesaid, and other exploded and thrown-aside devices that time has outstripped and supplanted by more efficient ones. These are the old-school men, and they would succeed much better in business if they took advantage of the discoveries and theories reduced to practice by other men. Pull out the old-fashioned machines and replace them with others better capable of doing the work! They occupy room and waste time every day that ought to have been economized.

GENIUS.

It is a somewhat remarkable fact that the children of celebrated men by no means inherit the peculiar talent of their parents or parent. History, past and present, is full of instances which might be quoted to prove the truth of this assertion; and the reader has only to reflect to call to mind, among those of his own day, statesmen, who, dying, left behind them an enviable fame, yet transmitted no portion of the genius which acquired it to their progeny. So all experience in the Old World goes to sustain the fact that genius is by no means hereditary, but latent. A wise father may have a fool for a son, and *vice versa*. May we not fairly question whether mere genius is of any particular value to its possessor? We say genius alone; a mere faculty for constructing, an aptitude for mechanical pursuits, or a love for the fine arts; all these, uncultivated and misdirected, are rather an incumbrance, and a disqualification for sterner work than any direct advantage to individuals. We have often heard, and not without regret, of certain young men, distinguished by their admirers as "geniuses," (to coin a word for the occasion) and upon investigation have found such claims based upon a sort of sleight-of-hand, which enabled them to whittle very bad imitations of boats, out of blocks of wood that might be made serviceable for some better purpose—boats that neither swim nor sail, but topple over like nut-shells and have an obstinate desire to move sideways. These productions are viewed by fond parents and relatives, as the first efforts of a remarkable genius—one who shall put George Steers' fame far in the shade, and outstrip all previous efforts in ship-building. The same facts may be noticed in the case of painting, a talent for modeling in clay, and kindred branches of art.

Far be it from us to disparage the first efforts of self-taught, persevering men. These remarks by no means apply to them; but are directed toward that class of idle, whining, shiftless young men who lounge in the house, wear out their clothes and the patience of their families by homilies on "fate," "destiny," the "coldness of the world," and similar phrases—the stock in trade of "geniuses" all over the world. To such young men we would say your talent lies in handling an ax; your genius is concealed in the handle of a blacksmith's hammer; get up and learn a trade; get out of the rocking chair and go to the forge, and if you have any genius inert and dormant in you, it will soon work its way to the surface and shine among men. We have observed a great many so-called "geniuses" in this world, and seen some of them grow to manhood. They generally have some remarkable model of a steamship that will sail 40 miles an hour on about a pound of coal. They are out at the elbows, and of a generally dispirited cast of countenance; they are sanguine on perpetual motion, and, much more modest than Archimedes, only require a peculiar spring or a screw to move the world; and it is with no little regret that we have seen their feeble efforts baffled and set aside because they were not thoroughly and earnestly prosecuted. There is nothing more certain in the world than that real talent and genuine genius is certain of its reward, if it only manifests itself in a proper way. Men are not generous enough to each other to go searching about the world for the light that is hidden under a bushel, and if any individual thinks to attract the notice of his fellows by the dismal glimmer of a penny "dip," set in a candlestick of surpassing beauty, he may abate his pretensions at once and for ever. Set to work in earnest, oh, young men of the nation!—turn in and fall to, on the work of the world! War leaves the fields desolate, the loom idle, the workshop as silent as the cemetery. Bestir yourselves! and if you have genius, make it evident by producing something to set in motion the forces that falter. Make the wilderness blossom as the rose, cause the shuttles to fly more swiftly to make up for lost time, and make the ponderous hammers to rise and fall with increasing velocity. If you have genius, let it shine! bring it out, and bestow it upon mankind, and in return, your fellows of the present day, and posterity also, will concede all that your vanity now prematurely claims.

REPORTED FAILURE OF THE STAFFORD PROJECTILE.

Commodore Turner on board of the iron-clad *New Ironsides*, in obedience to official instructions, has lately experimented with the "Stafford projectiles." He states that every precaution was taken to give them a fair trial, the instructions for their use being carefully observed. They were fired with 16 pounds No. 7 powder, from the 150 pound Parrott guns of the *New Ironsides*. "In every instance," says the Commodore, "they failed, and in the four first discharges, the casing of wood in which they are imbedded was shivered to pieces immediately, and so near the ship as to make it perilous to use them. I am convinced that with this class of gun they are utterly useless; I should not think of using them in action, after the experience I have had. I desire to make a very emphatic report to the Bureau on this subject, for either these projectiles are a great imposition, or the instructions accompanying them have been misinterpreted as to the manner of using them."

It is stated that each of these projectiles cost $46, and that a charge of $60,000 has been made against the Government for a quantity furnished.

The Stafford projectile has heretofore been regarded as one of the most wonderful and valuable auxiliaries of war. Repeated experiments had demonstrated its marvellous success; reports of various tests to which it has been subjected have appeared in the col-

© 1863 SCIENTIFIC AMERICAN, INC.

umns of the SCIENTIFIC AMERICAN. Many of these trials were made under the direction of experienced Government officers, specially appointed for the purpose, and they appeared to establish the fact that the invention was one of a remarkable character. Some of the targets were clad with 6 inches of iron, with a strong wood backing; but the projectiles passed through the mass without the least difficulty. In other instances the projectile has been thrown a distance of 4½ and 5½ miles. Of course no such results could have been obtained had there been any tumbling or other defective operation of the shot. We are constrained to believe that in Commodore Turner's trial there was either some mismanagement in the handling of the shot, or some defect in their construction. We must have further evidence of failure before we give up our faith in what has heretofore been demonstrated to be a good invention.

One of the peculiarities of Stafford's projectile is that it is generally made smaller than the bore of the gun, the intervening space being filled up by wood or other casing, attached to the shot. This casing flies from the shot when the latter leaves the gun, giving the projectile a free flight. It is alleged that by this method a large area of explosive force is made to act effectively upon a projectile of small diameter. Immense velocity and great penetrative power are thus obtained. Engravings of the Stafford projectile will be found in No. 14, Vol. VIII (new series) of the SCIENTIFIC AMERICAN.

DISTILLATION AND EFFECTS OF HEAT.

There are two kinds of distillation, which are entirely distinct in their nature and results, and by which the effects of heat in changing the character of substances are exemplified in a most remarkable manner. These processes are called *common*, and *destructive* distillation. The former consists in applying a moderate degree of heat to a substance, such as water by which it is converted into vapor, and after this it is again converted into water by refrigeration. Or it is perhaps more clearly explained by the treatment of a liquid, such as a mash of malt, which contains ardent spirits combined with water. By the application of a lower temperature than that of boiling water, to the mash in a still, the spirits pass over in the condition of vapor, are condensed in a refrigerator, and thus they are separated or distilled from the mash. This is common distillation, by which no chemical change is effected in the nature of the substances treated. The water is first converted into vapor by heat, then converted into water again by cold; and as the spirits boil at a lower degree of temperature than water, they are separated from the water by distilling at a low temperature, and then are converted into a liquid state again by cooling.

Destructive distillation consists in applying a high degree of heat to substances in retorts, by which products of an entirely different chemical character from the substances treated are obtained. Some of the most astonishing results connected with modern chemistry and the practical arts are due to destructive distillation. For example, when a charge of bituminous coal is placed in a retort raised to red heat, a great portion of this solid is converted into the gas which is used for illumination, and it will flow unchanged for miles through tubes exposed to the lowest atmospheric temperature. Common oil subjected to the same treatment will also produce gas, but it is not converted by refrigeration into oil again. Many liquids and several solids subjected to such a degree of heat, produce similar results; hence as the character of the products is entirely changed by the operation, it has been called destructive distillation.

The wonderful effects of heat in distillation are shown in the variety of products obtained, and the study of these deserves general attention. For example, in the distillation of cannel coal, a different chemical product is obtained with almost every different degree of heat to which the coal is subjected. If the heat is gradually raised, a very clear oil first passes over, at a comparatively low temperature, then darker colored oils, then thick tar. On the other hand, if the coal is subjected at once to a low red heat, most of the matter that would otherwise have passed off as oil and tar is converted into gas, and all these products are different in their chemical characteristics. A full cherry red heat is that at which coal in a retort is treated to obtain the best illuminating gas. If the heat is raised much above this, a greater quantity but an inferior quality of gas results. The manufacture of a heavy oil and tar from distilled coal, was conducted by Lord Dundonald, in Scotland, about 1768, long before gas was made for public illumination. The tar was employed for coating the bottoms of ships, to prevent the attacks of the ship worm, before copper sheathing was generally applied. In the spirit with which the manufacture of tar was pursued, Lord Dundonald narrowly missed producing coal oil for commercial purposes, although he used a retort similar to some that were employed within the last four years for distilling coal in making kerosene.

One of the most remarkable products of distilled coal, peat, &c., is parafine, which was discovered by the German chemist Reichenbach, about 1833, as one of the products of tar. It is a white substance, resembling wax in some of its features. This chemist also obtained oil, which he called eupion, from tar. About the same time that parafine was thus obtained from coal tar, Dr. Christison, of Edinburgh, also produced it from Rangoon petroleum, and called it petroline. From this petroleum he also distilled several oils, such as those which are now in common use for illumination. Prior to 1860, the distillation of coal had been carried on for several years upon a very expensive scale in Europe and America for obtaining illuminating oil; but the great supplies distilled in nature's extensive laboratory, situated in the valley of the Alleghany, have supplanted all the similar products of coal distillation, and the amount exported this year, up to the present time, exceeds fifteen millions of dollars.

A good idea of the varied and remarkable effects of heat upon coal in distillation may be communicated by stating that forty-two different substances have been separated from coal and classified, and the production of some of these engages important branches of industry. Among them are illuminating gas, coke, ammonia, naptha, benzole, heavy oil, parafine, tar, aniline and all those beautiful colors derived from it which are now so common on silk and woolen fabrics. Distillation, and the effects of heat upon various substances, form most interesting and instructive studies to inquirers after scientific knowledge.

BREECH-LOADING RIFLES AT THE NEXT FAIR OF THE AMERICAN INSTITUTE.

We learn from the officers of the American Institute, that a prominent feature at the Fair, this season, will be a general exhibition of breech-loading rifles. An opportunity will be given for a competitive trial of the various kinds manufactured, and a diploma or premium will be awarded to the best gun.

This will doubtless be the most attractive and popular part of the exhibition. We also suggest to the managers to permit a trial, at all ranges, between the best breech-loaders and the best muzzle-loaders, in order to settle the mooted question whether a breech-loading rifle with fixed ammunition carries as accurately as a perfect muzzle-loader. On account of the great convenience of breech-loading rifles, there is no doubt that they will entirely supersede the old-fashioned arm, provided that they carry the bullet with equal precision. But a defect in this particular will more than counterbalance all their other advantages; for, if there is anything that is sure to disgust a sportsman with his rifle, it is to have it send the bullet to a place different from that at which it is aimed. It is also asserted by some that the complication of the breech-loader is fatal to its general introduction in the army. While but few persons are found who object to the employment of this class of weapon as a national arm; there are others who maintain that the delicacy of workmanship unavoidable in a breech-loading rifle, materially detracts from its utility for field or cavalry use. These are disputed points, which we hope to see settled in favor of the breech-loader; and we desire to have the coming tests made thorough and severe. Let us have no holiday decisions; but submit the competing guns to searching scrutiny, at least as thorough as they will undergo in actual service. Let the breech-loader be exposed to a cloud of dust, such as is inevitable in a long day's cavalry ride, and then see whether the closely-fitted joints will work so that the trooper can rely upon his weapon, with perfect confidence that it will not be found unmanageable in the hour of peril. Let moisture have a fair chance at the rifle also, so that the public may know how the parts interchange and play in this condition. Let the gun be thrown rudely to the ground, so that all interested may know to a certainty just how much rough usage a breech-loader can stand;—whether it is a bona-fide weapon, or merely a delicate combination of machinery liable to become deranged at the slightest irregular proceeding. Let us know whether it is, in gunnery, what the spy-glass is in optics; or whether it be like the microscope, which requires previous education to manipulate and understand. These are vital points in the utility of breech-loaders, which we should like to have proved or disproved beyond cavil. The greatest value of a muzzle-loading gun is that it is, under all reasonable circumstances, wholly reliable; and it is of very little importance to a trooper or sharpshooter, when his weapon fails him at a critical time, to know that a number of experts have decided that the arm then in his possession is infallible. We do not propose that unreasonable violence should be offered the weapons; but we are decidedly opposed to the sort of encomiums generally lavished upon arms, which are not at all borne out or justified by their mechanical value, or their subsequent performances.

RECENT AMERICAN PATENTS.

Oil Skimmer.—In boiling fish or other materials for the purpose of extracting the oil, and in heating other substances or liquids for the purpose of evaporation or otherwise, the surface of the liquid is generally covered with scum, and the impurities or dregs precipitate, and occupy the bottom part of the tank or still, the clear good liquid being in the middle. The object of this invention is to draw off the clear liquid from the middle, free from the scum on the top, and from the dregs on the bottom. The invention consists in the employment of a shallow saucer-shaped vessel, provided with one or more floats, and with a pipe leading from its lowest point to the barrel or other vessel which is intended to receive the oil or other liquid; said pipe being sustained by one or more floats in such a manner that the saucer-shaped vessel can be adjusted to float on a level with the surface of the clear liquid, under the scum and above the dregs; the vessel being balanced by the floats attached to it, and the pipe being sustained by the floats which are secured to the same, the clear liquid draining off through said pipe until the saucer-shaped vessel settles down on the dregs at or near the bottom of the still or tank. Address Israel Peck or W. H. H. Glover, the inventors, Southhold, N. Y.

Dredging and Ditching Apparatus.—These improvements are more especially designed to be applied in combination with an apparatus termed a "suction dredging boat," patented May 10, 1863, their object when so applied being to cut, bore, pick, break and tear up all obstructive deposits of mud, sand, clay and other matter from the beds of rivers, harbors docks and other places, or to deepen the same, and to cut and break up turf and earth in swamps and marshes and other places, and reduce all such substances and material to a soft or pulpy or sufficiently diluted condition or get them so mixed with water as to admit of their removal by the pumps of that apparatus; also for cutting ditches and canals, and for forming dikes or embankments and filling up lots and improving swamps and marshes and other low lands, and bringing them to the grade of uplands for cultivation, by depositing upon such swamps, marshes or low lands, the material taken up in cutting the ditches or canals from the adjacent waters. The said improvements may, however, be used in connection with any other kind of boat for the purpose of bringing the matters and substances specified to a condition to be removed by the action of a natural current, or the tide or by any other suitable means; and in some instances the said improvements might be arranged upon a carriage to run upon land, where a stream of water may be obtained to effect or facilitate the carrying away or removal of the material which is loosened by the cutting, boring, packing, breaking, and tearing-up operations. William Atkinson, deceased, late of Brooklyn, N. Y., was the inventor of this improvement; and further informa-

© 1863 SCIENTIFIC AMERICAN, INC.