roads and streets, can form no idea of its loveliness a hundred years ago, when Johnny Macadam was a junior clerk.

Five years after his arrival here, the revolutionary war broke out, and he was compelled to side for the king or the colonies. Being but nineteen years of age at the time, and of Scottish birth (there is a great deal of Tory blood in Scottish veins), he espoused the cause of George the Third, along with his uncle William, and a majority of the wealthier merchants of the city. In 1776, when he was still but twenty years old, General Washington was compelled to abandon New York, which, for the next seven years was in the hands of the British. After a time, this young man received the valuable appointment of prize-agent for the port of New York, which gave him a percentage upon the prizes brought in by British privateers and men-of-war. His percentage was probably pretty liberal, for he is reported to have gained a considerable fortune from his office.

Far indeed was it from the thoughts of the New York loyalists that the time would ever come when it would be beyond the power of their king to protect his faithful subjects in Manhattan. And yet that time came. In 1783, John Macadam, then twenty-seven years of age, with all the other Tories of note, was obliged to leave New York, and abandon so much of their property as they could not carry off.

On reaching his native Scotland, however, Macadam was rich enough to buy an estate in the county of Ayr, and that estate was large enough to make him an important man in the county. We find him soon a county magistrate, a trustee of the public roads, and Deputy Lord Lieutenant—offices which are never bestowed in Great Britain except upon persons of wealth and social importance. It was while he held the office of Ayrshire road trustee that he began seriously to study the subject of road making. At that time roads were universally bad, except where Nature herself had made them good.

"A broad-wheeled wagon," wrote Adam Smith, in 1774, "attended by two men, and drawn by eight horses, in about *six week's time*, carries and brings back, between London and Edinburgh (494 miles), near four ton weight of goods."

Dr. Franklin, writing in 1751, speaks of traveling seventy miles a day in England, by a post-chaise, as a most extraordinary achievement—killing to man and beast. Much of the soil of England and Scotland is a deep, rich clay, which makes the best farms and the worst roads in the universe; and yet it is particularly well adapted to the system of Macadam.

What it was which suggested to him the simple expedient of covering the soft miry roads with broken stones, averaging six ounces each in weight, has not been recorded. We only know, that, during the long wars between England and France, he held important appointments under the Crown, which made it his duty to superintend the transportation of supplies.

He then renewed the study of roads, and pursued it with all the unflagging perseverance of a thorough Scotchman. At his own expence, he traveled thirty thousand miles for the observation of roads, which occupied him more than five years, and cost him more than five thousand pounds sterling. I presume his idea was entirely original; for we cannot find any trace of a macadamized road previous to his day. The only notion which existed, previous to his time, of making a permanent road, was to pave the whole surface with pebbles, blocks, or slabs of stone; either of which was far too expensive to become general.

It was not until 1811, when he was fifty-five years of age, that Macadam made his celebrated report to the House of Commons, in which he described the condition of the roads of Great Britain, and gave an outline of his system for repairing them. In 1815, a district was assigned him for an experiment. Need I say that he met with nothing but opposition, not only from every one connected with the old road system, but even from the farmers through whose lands the first macadamized road was to be made! Such was the prejudice against his plan that he could not get the old road-makers to execute his orders, and he was obliged to get his three sons to come and assist him in superintending the details.

But the tide soon turned. A good macadamized road is an irresistible argument; and there soon arose a rage for making such roads, as furious as the former prejudice against them. Four years after he began operations, there were seven hundred miles of macadamized road in Great Britain; and, before the death of the inventor, out of the twenty-five thousand six hundred miles of high roads in England, there were not more, it is said, than two hundred and fifty miles not macadamized.

John Macadam was a strangely disinterested man. He not only refused to receive any reward for his services, including an offered knighthood, but he would not take a contract to make or repair a road, and he declined some pressing and liberal offers to take charge of the roads in foreign countries.

He was twice married; first, during his residence in New York, to a Long Island lady; and again, in his seventy-first year, to another American lady, Miss de Lancey, of New York, a member of the family which has given its name to one of our streets. He died in 1836, aged eighty years.

I have spoken above of the excellent roads in the Central Park of New York, as macadamized. I should, perhaps, have styled them *Telfordized*, for it was Thomas Telford, a famous English engineer, cotemporary with Macadam, who invented the particular plan upon which those roads are built. Macadam laid his broken stones upon the naked soil; but it was Thomas Telford who improved upon Macadam's idea by laying large, rough, flat stones upon the soil, placing upon them the broken stones of Macadam, and covering the surface with fragments of the size of a boy's marble.—*New York Ledger*.

The Fort Montgomery Explosion.

The New York *Sun* states that the recent terrible explosion in a mine near Fort Montgomery, on the Hudson river, was occasioned by nitro-glycerin in its new form of "dynamite." Some of it had been sent to the mine for trial. Having a three-inch hole, four feet deep, to fire, the foreman pounded the compound under a hammer to the consistency of fine powder, while the boss of the gang scraped it from the plank on which it was pulverized, and put about seven pounds in his can which had a thimble stopper, when the gang of three men left for the shaft. While on their way, the can was opened by the man who had it in charge to exhibit the powder to others, and as there were lighted pipes in the company, a spark came in contact, when the explosion took place. It is quite evident that this terrible substance has been somewhat tamed, but not yet sufficiently so as to justify the neglect of ordinary precaution in handling it.

Manufacture of Silk in California.

Since writing the article entitled "Why not Grow our own Silk?" we find the following additional particulars in a California exchange, relative to the silk culture in that State: "Mulberry trees are here in great abundance, the 'Natural Wealth of California' giving 4,000,000 of trees for 1867, and we may say at least 5,000,000 for next year's use. The production of eggs has kept pace with the means to supply food for the worms, for it has been stimulated by a full demand from abroad. We raise two crops of cocoons in a season, as the rule, but three crops are not unfrequent, though the third crop draws too severely on the vitality of the tree, by over-plucking of the leaves, and it should be discouraged. We can expect but one crop of eggs in a season. The second is left to us for home use. The cocoon, which the miller cuts his way through, suffers a loss of value by the continuity of the thread being broken. But it makes good silk for goods not requiring long staple. Of this spun silk, we are accumulating stock. Mr. Englander, who made so creditable a display of silk fringes at the Fair, says it can be worked up here by our present facilities. Beside this stock, the sound cocoons left for silk, this year, may be rated at one million, and so rapid is the reproduction, that this would make ten millions for 1869. To reel, weave, and complete the fabric would give steady employment to one thousand hands, beside the great number that would find work gathering leaves, attending and feeding the worms. When we consider, that in 1870 the rapid increase of silkworms, all healthy, will give us five to ten times more cocoons than 1869, we are sensible there is no time to be lost in going into the making of silks. In one season the simple unwinding of cocoons may be taught very expertly to any number of girls. Making silk sewing thread is as simple as making other thread. Dyeing silk, though it has some peculiarities, can be done by workmen skilled in other fine coloring, and, at least, the artesian waters of our San Bruno range have the requisite freedom from impurity. Can we weave silk? will not be questioned by any one who has seen the silk cloth actually and continuously made during four weeks at the Fair, by Messrs. Joseph and Isidor Neumann, whose perseverance is worthy of the highest reward; and we trust they will soon realize it in substantial success and in public acknowledgment. Mr. Neumann has a number of new looms of the best construction ready for use, and he has invented a reel, which was in use at the Fair, and which is all that can be desired. Though silk eggs bring a price that tempts us to export them just now, the establishment of manufactories would show that it would pay us better to lose the surplus eggs and save the cocoons for thread and cloth. Notwithstanding the price of labor, we can make our own silk for 25 per cent less than the importer can put the foreign fabric on his shelves. Our land is cheaper, our trees are more prolific of leaves, our worms are not infected with disease that kills half of them and injures the silk-making perfection of the rest; our trees are new, and the quality of the leaves for food is untainted by the effects of long-continued plucking. Our climate alone gives advantages in the superior weight of our cocoons, and in the perfection of the silk they yield, to counterbalance the greater wages of labor, if we had not the other advantages enumerated; and no branch of industry affords so great a proportion of light and pleasant work for the employment of women and children."

Carbonic Acid in the Atmosphere.

The German chemist Pettenkofer, several years ago, introduced a new and more accurate method for the quantitative determination of the amount of carbonic acid in the atmosphere. By means of this method, Thorpe has obtained the following result: On the land the amount of carbonic acid in the atmosphere varies from $2\frac{1}{2}$ to 8 volumes for 10,000 volumes of air; the mean for Europe is 4 volumes in 10,000 of air; in New Granada, South America, Levy had previously found 3·8 volumes during the rainy season, and 4·6 during the dry season. On the sea the variations are much less, and the amount of carbonic acid is also less; the mean of all determinations of sea air being only 3, while land air gave 4 volumes in 10,000 of air.

To show the difference between the free atmospheric air and the air in our school rooms and other crowded places, we collect the following from results, most of which were obtained by means of Pettenkofer's method; all the figures given as the amount of carbonic acid express the number of volumes of carbonic acid in 10,000 volumes of the air analyzed:

Free atmospheric air, 4. Pettenkofer's study, 3,000 cubic feet capacity—after having been there for four hours, 5 2-3; after his assistant had been with him for a little while, 9. [illegible]'s laboratory—capacity 46,000 cubic feet—air taken at various intervals during a lecture (about 3,000 persons present), in March, 6 P. M., 11; same lecture, 6 1-2 P. M., 23; same lecture, 7 P. M., 32; this last time the air was somewhat oppressive. A school room—10,400 cubic feet capacity—70 girls between nine and ten years old; temperature of room, 66 deg. Fah., at the close of the instruction, 72—or about eighteen times as much as in the free air! Sleeping rooms, for soldiers in Munich—one room, 10,147 cubic feet capacity, 19 soldiers—in the morning, 46; another room—capacity 10,255 cubic feet, 10 soldiers—in the morning, 34. A theater, very crowded, Roscoe found, 4 feet above the stage, 23; 34 feet above the stage, 32. A court room, in London, 44; Underground Railways, London, from 4 to 12. Air, fresh, inhaled, 4. Air, exhaled, on average, 400—or 100 times as much as the air inhaled.

From all determinations yet made, it may be concluded that 10 volumes of carbonic acid for 10,000 of air, are quite comfortable; when this quantity is not exceeded, the ventilation is good, no unpleasant odors are observed; but that rooms containing much more than 10 of carbonic acid in 10,000 of air (or one in a thousand) are not fit for a prolonged sojourn of people.—*Prof. Gustavus Hinrichs.*

OPINIONS OF THE PRESS.

We are indebted to our cotemporaries for many very flattering notices, only a few of which we can copy. The *Chicago Railway Review* says:

Our readers are well aware of the value which we attach to the SCIENTIFIC AMERICAN, from the frequency with which we quote its articles and refer to its conclusions. The excellence thus indorsed by us, in common with the entire newspaper press, lies not only in its scope and versatility, but in the simplicity and intelligibleness of its style. It covers the whole field of practical science, but without pretension, technicality, and dreary pedantry. It is emphatically a journal of to-day—an "abstract and brief chronicle"—brief but comprehensive and exhaustive of all branches of applied science which find a field in modern invention and industry. The last number of the XIXth volume comes to hand with a finely engraved representative title page, an earnest of the realization of the liberal promises of the prospectus of volume XX. Glancing at the index of subjects discussed and illustrated in the volume just closing, it is hard to see where improvements can be made; but we take the word of the liberal and enlightened publishers, that noticeable improvements will be made, and wait curiously, but not skeptically, to see what they will be.

The *Ambassador*, published in this city, says:

The SCIENTIFIC AMERICAN has a place, all to itself, in the world of scientific readers and writers—having neither peer nor second. It is a just compliment to American thought and enterprise, that America can lead the world in the publication of such a journal. Its specialties are practical information, art, science, mechanics, chemistry, and manufactures. Every patent invention is recorded; many of them described; many illustrated by large and handsome engravings. Every created thing, from a steam engine to a top, has a biography in the SCIENTIFIC AMERICAN. For reading matter it has carefully prepared papers on all sorts of subjects within the limits of science and art.

The Iowa *Instructor*, the educational organ *par excellence* of Iowa, thus speaks of the value of the information obtainable from the perusal of our columns to the proper qualification of teachers for their arduous and responsible labors:

The SCIENTIFIC AMERICAN is unquestionably *the* journal for all those who delight in following the inventive genius of the people of this country in that direction which at present is most prominently developed. If we were at all phrenologically inclined, we should, in giving a description of Uncle Sam's cranium, pronounce his bump of mechanical contrivances most wonderfully large—especially after a close inspection of a few numbers of the SCIENTIFIC AMERICAN. Yet it is astonishing to notice that few persons outside of the mechanical arts take an interest in these matters. Surely it is as important to understand the peculiar appliances and ingenious processes, which, as by magic, transform the natural products into such articles which civilized society demand, as it is to be able to know what peculiar twists the ancients were fond of attaching to nouns and verbs, to indicate their mutual relations. At any rate *we think it neither improper nor unguarded not to be ignorant* of some of the processes of the mechanical arts; and, indeed, we know that in other countries such knowledge is considered essential to education. If, therefore, any teacher has a predilection for such matters, we trust he will cultivate this faculty of his mind and give the result of his readings, study, and work to the pupils under his care—in order to make the children honor labor and love those who have benefited mankind by their mechanical genius.

More About the Suez Canal.

A captain of an English merchant vessel who has recently been making a trip through the Suez Canal, writes as follows to the *London Times:*

The canal, as designed, is about a hundred miles long. Of this length about half is sufficiently advanced for the sea water to reach fifty miles—that is, into the middle of the Isthmus. It is finished to its full breadth, which is a hundred yards, or the width of a considerable river, but not to the intended depth of twenty-six feet. The remaining fifty miles not yet penetrated by the sea water, are in various states of progress: parts are excavated, parts are under water, parts will have to be laid under water, which is to be supplied from a great lake not yet filled, while a good many miles have to wait for large blasting operations. To English ears it must sound promising that a good deal of clay has to be cut through; for nothing can be dealt with so successfully in this country as that material. The completion of the southern half of the canal would look like a very long work but for the fact of the immense subsidiary works being completed and a vast mass of appliances being on the spot. The service canal from the Nile to the mid point of the salt water canal, and branching thence to either extremity, is an immense work, not less than a hundred and fifty miles long, and in full use for the supply of fresh water for navigation and for otherwise assisting the work to be done. The port at the Mediterranean end is an immense work, already available. The sea channel at the Suez end has difficulties, but only such as engineers are familiar with. Forty enormous and costly dredging machines are at work on different parts of the canal—chiefly, we conclude, the northern half—discharging mountains of mud, sand and clay over the banks or into barges. The rate of expenditure is put at £200,000 per month, or two and a half millions a year. Our informant calculates that a driving wind, after blowing a month together, will send into the canal, when finished, five hundred tuns of sand a day, or fifteen thousand tuns a month. This, however, is no more than a single dredging machine would be able to keep down at a certain moderate cost in coal. The difficulty of keeping up the banks of the canal, exposed as they will be to the wash of steamers, and to a surface often agitated by the wind, is a more serious matter, but one which does not enter into the present question. Upon the whole, it does seem a moral certainty that, at least in two or three years—for one year seems out of the question—this great undertaking, worthy of a heroic age, will be brought to what we may fairly call an actual completion. In the course of the year 1871, we may probably see the sea water of one ocean flowing into the other.

Improved Automatic Horse Hay Rake.

That the department of agriculture is highly estimated by inventors, at least as affording a field for the exercise of their tal- ents, is sufficiently proved by the frequently offered improvements in implements of husbandry, especially those designed to save labor and time. Among these none have received more frequent attention than those relating to the cutting and gathering of the hay crop, and none have been of greater utility. To be sure, objections to their use and difficulties in their management have been found in a number of horse rakes, but improvements following improvements are rapidly bringing this implement to perfection. The engraving presents a perspective view of a horse hay rake which offers some points believed to be improvements not found on other machines.

The wheels, two in number, are rigidly secured to their respective axles, the outer bearings of which are in a box secured to the under side of the main frame of the machine and the inner portion supported by similar boxes secured to cross bars of the frame. The inner ends of the two axles support a gear or pinion turning freely, the outer faces, or sides of which are formed into ratchets with which sliding ratchets on the respective axles engage, these latter allowed to slide on the axles, but held to the ratchet sides of the pinion by means of spiral springs, and connected to the axles by pins traversing slots in the axle, or by forming the axle ends and the holes in the clutches square. This gives independent action to each wheel in backing and unites the two wheels, when the vehicle moves forward, so that the two axles act as one. A toothed rack bar, connecting at one end with a lever having a handle at the top, and at the other end with a foot lever in front of the driver's seat, serves to raise by means of the pinion on the main shaft or combined axle, the teeth of the rake, which pass through slots in a hinged bar at the rear of the machine. The separate teeth are attached to thimbles that turn freely and independently on the rake head shaft, so as to enable them to reach depressions in the surface of the field. When driven on the road the rake teeth are held from the ground by the lever at the right hand of the driver's seat. To discharge a rake-full of hay the driver presses upon the foot lever, bringing the rack in contact with the pinion that raises the rake, and allows it to fall soon as the rack section has passed the circumference of the pinion. The operation of the machine and its advantages may be comprehended by an examination of the engraving in connection with this description. It will be seen that the operation of the rake is at all times under the control of the driver, and that except when he wishes to instantly elevate the rake teeth by means of the hand lever, both hands will be free to guide the horse.

Patented June 16, 1868, through the Scientific American Patent Agency, by Jonathan Hunsberger, who may be addressed for the sale of the entire right, or for state and county rights, at Skippackville, Montgomery Co., Pa.

HUNSBERGER'S PATENT SELF-DISCHARGING HORSE RAKE.

Improved Engine and Signal Oils for Railroads.

Throughout the country, says Pease's Oil Circular, there is a better demand for first-class oils. In many cases what is gained in price of cheap oils is lost ten times over in the repair account. There is an enormous loss of power in our railroads by the use of cheap oils, and we include in this those oils easily affected by heat. The experiments of Metz and Morin in 1831, and others up to the present date establish the fact that the amount of friction is found to be dependent rather upon the nature of the unguents than upon the surface of contact, and the nature of the oils must be measured by the pressure or weight tending to force the surfaces together.

There is no question but that there is a loss of 30 to 56 per cent of power on most of the roads in this country by not looking into and understanding the laws of friction, and the effects of heat and pressure upon the oils used. They must be based upon scientific principles, and adapted to the uses intended, otherwise they fail to accomplish any satisfactory results, and a great loss of power and destruction of machinery is the result.

Friction, immediate or long continued has the same effect upon oils; in one case it is immediate, as in a steam cylinder, in the other it is slow and long continued, as on the slides and smaller bearings. Oils must be made to form a perfect separation, otherwise the friction is increased and is dependent upon its greater or less viscosity, whose effect is proportional to the extent of the surface between which it interposed.

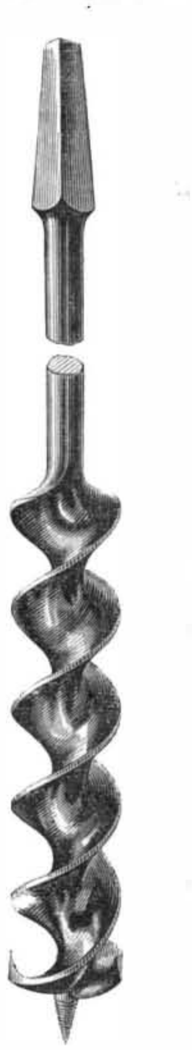
Those roads that have looked into this important matter, ranking the third or fourth in expenses, are now saving tens of thousands of dollars every year.

There is no occas on for a hot journal on any road under ordinary circumstances and using proper oils. There is no occasion for cutting of journals and destruction of valve seats, if a little thought would only be given to the subject of pressure and friction. The wonderful chemical effect of some of the poor cheap oils upon the iron surfaces and journals of some of the roads is entirely overlooked. Has it ever occurred to railroad men that the use of oils of strong acid reaction has a tendency to weaken the strength of the boiler itself, as they have the power to cut and destroy the bolts of the steam chest and cylinder?

THE INVENTOR OF THE VELOCIPEDE.—The last number of tho *Moniteur de la Photographie* of Paris, (1st Nov., 1868) has an interesting series of letters upon the invention of the velocipede, which, it appears, would be due to Niepce, for whom is claimed also the invention of photography. The letters in question are written from Claude Niepce to his brother Nicephore Niepce, and are dated from Hammersmith, near London, Nov. and Dec., 1818, and August, 1819. We do not glean from them that the first idea of a velocipede originated with Nicephore Niepce, but simply that he was occupied with some experiments concerning the improvement of this kind of locomotive. If no mention can be found of a velocipede prior to the year 1818 doubtless Niepce has good claim to its invention.

KASSON'S CONCAVO-CONVEX AUGER AND BIT.

The front or working faces of this auger bit are concave and the rear faces are convex giving great strength to the twist and removing the chips without undue friction against the edges of the hole, thus preventing clogging and gumming. The cutting lip is merely a continuation of the twist, so that if the auger should be broken at any portion of its length another screw and other cutting edges can be formed by cutting the twist at a plane nearly at right angles with the axis of the auger. The convexity of the cross section of the twist, increasing toward the center, is, in effect, a strengthening rib, making a very stiff tool. This auger, or bit, is adapted to all kinds of wood, hard or soft, and is specially adapted for boring hubs, pumps, etc., and to all descriptions of wood boring machinery. Having less friction than the ordinary style of auger it is less liable to become heated, and it relieves itself perfectly of the chips, without clogging, and does not require to be withdrawn for clearance.



Patented through the Scientific American Patent Agency, January 15, 1867 (reissue dated April 9, 1867), by A. C. Kasson of Milwaukee, Wis., assignor to himself and N. C. Gridley of St. Louis, Mo. Manufactured and for sale by the Humphreysville Manufacturing Company; J. M. Watkins, agent, who may be addressed at No. 5 Gold street, New York.

A CURIOUS fact in connection with the practical working of the Atlantic Cable Telegraph is that messages sent from London to-day arrive in New York yesterday.

A Newly-Discovered Property of Gun-cotton.

It has been found that the explosive force of gun-cotton may, like that of nitro-glycerin, be developed by the exposure of the substance to the sudden concussion produced by a detonation; and that if exploded by that agency, the suddenness and consequent violence of its action greatly exceed that of its explosion by means of a highly heated body or flame. This is a most important discovery, and one which invests gun-cotton with totally new and valuable characteristics; for it follows, as recent experiments have fully demonstrated, that gun-cotton, even when freely exposed to air, may be made to explode with destructive violence, apparently not inferior to that of nitro-glycerin, simply by employing for its explosion a fuse to which is attached a small detonating charge. Some remarkable results have been already obtained with this new mode of exploding gun-cotton. Large blocks of granite and other very hard rock, and iron plates of some thickness, have been shattered by exploding small charges of gun-cotton, which simply rested upon their upper surfaces—an effect which will be sufficiently surprising to those who have hitherto believed, as every one has believed, that unconfined gun-cotton was scarcely to be considered as explosive at all, that it puffed harmlessly away into the air, not exerting sufficient force upon the body on which it might be resting to depress a nicely balanced pair of scales, supposing the charge to be fired upon one plate of the scale. Further, long charges or trains of gun-cotton, simply placed upon the ground against stockades of great strength, and wholly unconfined, have been exploded by means of detonating fuzes placed in the centre or at one end of the train, and produced uniformly destructive effects throughout their entire length, the results corresponding to those produced by eight or ten times the amount of gunpowder when applied under the most favorable conditions. Mining and quarrying operations with gun-cotton applied in the new manner have furnished results quite equal to those obtained with nitro-glycerin, and have proved conclusively, that if gun-cotton is exploded by detonation, it is unnecessary to confine the charge in the blast hole by the process of hard tamping, as the explosion of the entire charge takes place too suddenly for its effects to be appreciably diminished by the line of escape presented by the blast hole.

Thus the most dangerous of all operations connected with mining may be dispensed with when gun-cotton fired by the new system is employed. It will readily be observed that this discovery, which we believe is due to Mr. Brown, of the English War Office Chemical Establishment, is likely to be attended with the most important results. Not merely is the strength of gun-cotton exploded in this way much greater than that of the same substance fired by simple ignition, but it now operates under conditions which were sufficient under the old system practically to deprive gun-cotton of its power. It has been said, and said justly, that if you want gun-cotton to exert itself you must coax it into the belief that it has a great deal to do. You must give it bonds to break and physical obstacles to overcome, with no outlet or possibility of escape. But now gun-cotton will exert itself, and put forth more than what was believed to be its full strength, whether to see any work to do or not. It will behave as less coy explosives have behaved before it—always with this difference, that it is half a dozen times as powerful as any of its rivals, with the exception of nitro-glycerin, to which in mere power even it is not inferior. This discovery, therefore, can hardly fail to give a considerable impetus to gun-cotton, and to lead to its universal adoption fur mining purposes, as soon as its new properties become generally known. In connection with possible military applications the discovery is invaluable. There can no longer be any doubt what agent should be employed for the breaching of stockades and the like; and the absence of all necessity for the use of strong confining envelopes will have an important bearing on the employment of gun-cotton for torpedoes and all submarine explosive operations, beside greatly simplifying mining and breaching operations in the field. We have, in fact, discovered several new advantages to add to those which already had sufficed to recommend gun-cotton as an explosive agent in preference to all others. The conditions that are fulfilled by a detonating fuse in determining the violent explosion of gun-cotton, under circumstances which hitherto have been altogether unfavorable to such a result, have been made the subject of investigation by Mr. Abel, and we hope at some future time to notice the conclusions at which he has arrived, as they appear to have a very important general bearing upon the conditions which regulate the development of explosive force, not merely from gun-cotton and nitro-glycerin, but from explosive compounds and mixtures generally.

A MICROSCOPIC club has been organized in Chicago. Two well-known citizens express a willingness to give liberally toward purchasing instruments and scientific works upon the subject of microscopic instruments.