IMPROVEMENT IN POCKET KNIVES.

The greatest defect of the ordinary pocket knife lies in the means provided for opening the blades. This is particularly noticeable in knives with strong back springs. Broken finger nails and sore fingers, with an occasional cut, bear witness to the desirability of an easier way of opening the blades. Our engraving shows an improvement designed to obviate this difficulty, and to facilitate opening the blade by substituting the pressure of the ball of the thumb for that

DU BOIS'S IMPROVED POCKET KNIFE.

of the thumb nail, while permitting of the same natural and intuitive motion to which knife users are accustomed.

The invention consists of a pivoted blade lifter arranged to shut within the handle, and provided on the inner side with a stud or spur capable of engaging the notch in the blade, and on the outer side with a knob or thumb piece to receive the pressure of the thumb. These lifters may be applied in two ways, as shown in the engraving, one being short, and having its pivot at one side of the blade pivot; the other being longer and placed on the same pivot with the blade and swinging on the same center. Either of these lifters may be made to serve the purpose of a button hook for glove or shoe, or as a nail cleaner, or they may be fitted for any other useful purpose in addition to that of opening the blade.

This blade lifter or opener applied to a knife, as described, will be found exceedingly useful where the blade is a stiff one, especially by ladies, many of whom are unable to lift the blades of a good knife with their thumb or finger nails. The motion of operating this lifter is such a natural and easy one that the lifter may be used in the dark as well as in the light.

The lifter may be provided with a back spring or not, as may be deemed advisable. It may be applied to knives at a trifling expense, and will prove a great convenience to knife users.

This useful invention has been patented by Mr. George W. Du Bois, of Wilmington, Del.

A Superior Whitewash.

For a useful lime wash for wood and stone *The Journal of the Society of Chemical Industry* gives the following method of preparation: Twenty liters quicklime are slaked in a suitable vessel with as much hot water as will stand at a level of 15 cms. above the lime. The milk of lime is diluted, and first 1 gramme of sulphate of zinc and then 0·5 gramme of common salt are added. The latter causes the lime wash to harden without cracking. A beautiful cream color can be imparted to the mass by putting into it 0·5 gramme of yellow ocher, or a pearly tint by the addition of some lamp black. A fawn color is produced by two grammes of umber and 0·5 gramme of lamp black. A stone color can be obtained from 2 grammes of umber and 1 gramme of lamp black. The color is applied, as usual, with a brush.

Hourly Tides in a River.

According to the *Lockport (N. Y.) Journal*, the water in the Niagara River at that place presented the phenomenon, on the afternoon of July 2, of hourly tides, the water rising and falling several feet once an hour. The cause does not appear to have been discovered.

Profit of Mushroom Culture.

The *Dublin Gardener* quotes a letter from a Mr. Barter, giving his results of mushroom culture, which shows that less than an acre of ground planted to mushrooms in the vicinity of London, supported four families—that of the lessee of the ground and those of three workmen receiving £4 each per week. Mr. Barter says that he is a carpenter by trade, and hired little more than an acre of land for £12 per year, and is gradually putting the entire area to mushrooms, expecting at least five tons weight of the esculent, at a wholesale price of one shilling a pound. He plants the spawn in beds two and a half feet wide, one of which, twenty yards long, yielded 160 lb. at one gathering, and another, 25 yards long, gave at the first gathering 76 lb., the second 200 lb., and the third 84 lb., or 360 lb. in three weeks.

AN AERIAL TURBINE WHEEL.

The form of the wings of this mill, says the *Revue Industrielle*, from which we translate, has been studied with a view of satisfying all the required conditions, which are comprised in the following rules: Conforming to the Smeaton rule of exposing seven-eighths of the geometrical surface of the sail; presenting as large a surface as possible at the extremity of the arms; curving the wings or sails so as to present the minimum of resistance to movement in light winds; and presenting at the rear a large surface as resistance to the air accumulated and compressed by rapid movement in high winds.

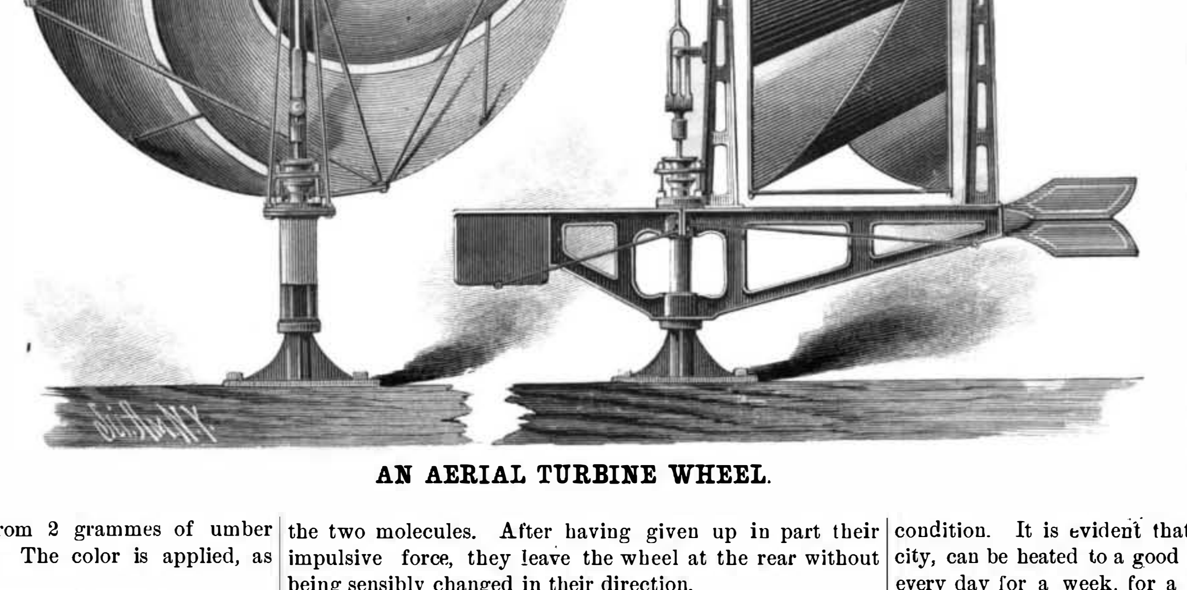
The results obtained by these rules are forms of wings which preserve an equilibrium between the force of the wind tending to overturn the structure and the cumulative resistance of the air tending to sustain it in the opposite direction. Mr. A. Dumont, the inventor of the turbine herewith illustrated, constructed a wheel having a diameter of 2 meters, and presenting a surface to the wind of 3·14 meters, and he made his observations with a wind of 8, 9, and 10 meters a second.

Under these conditions it raised a weight of 8 to 12 kilogrammes for every meter of surface, and when in full motion the wheel could easily be made to turn in a direction contrary to that of the wind. If a gust of wind struck the wheel the pressure was at once felt, and the rate of speed immediately increased and the equilibrium was re-established.

In order to observe the action of the wind as it passed through the chutes of the wheel of his aerial motor, Mr. Dumont tried the following experiment: One of his machines being actuated by a very violent wind, he placed at different heights in front of the wheel pieces of black and white paper finely torn, and he observed that the wind as it passed through the wings of the wheel did not undergo any deflection, and that the layers of different colors were found at the same height and in the same relation at a distance of 1·50 meters behind the wind wheel. The inventor has formulated this result as follows:

Two molecules of air meeting the wing, each at a different point, cross it and lose thereby a certain amount of their velocity, which nevertheless is always the same for the two molecules. After having given up in part their impulsive force, they leave the wheel at the rear without being sensibly changed in their direction.

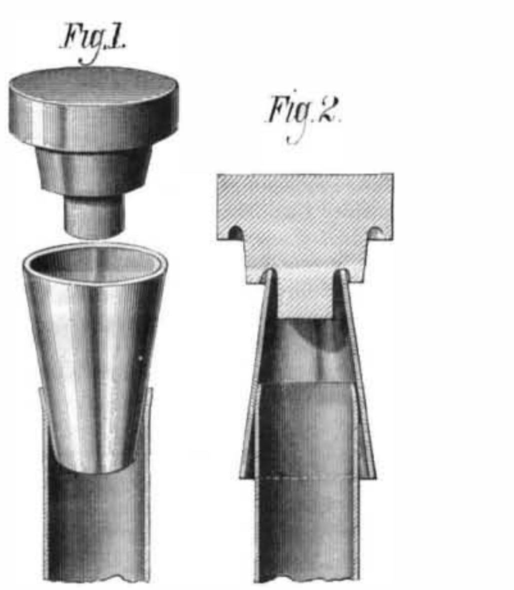
Further experiment proved, says our contemporary, that the apparatus with 2 meters of diameter, operating in a wind of 7 meters, and actuating a lift pump, develops a power of 10 kilogrammes. The results of other experiments have been tabulated and appear in the *Revue Industrielle*, but lack of space does not admit of our producing them.



AN AERIAL TURBINE WHEEL.

DEVICE FOR FITTING STOVE PIPES.

The annexed engraving shows a simple and effective device for contracting or expanding the ends of stove pipe to make the ends of the adjoining lengths fit into each other. The tool consists of a hollow cone of cast iron, which is inserted into or placed upon the end of the stove pipe length, and crowded downward to expand or contract the end of the pipe, as the case may require.



DEVICE FOR FITTING STOVE PIPES.

This tool is made large enough at one end and small enough at the other end to adapt it to the usual range of sizes. A wooden plug is provided which may be inserted in either end of the cone whenever it is necessary to drive the cone into or upon the end of the pipe. This will be necessary only in case of very heavy pipe, as the mere crowding down of the cone by the hands alone serves to expand or contract the ends of pipe of ordinary thickness.

The inner and outer surfaces of the cone being parallel, the edges will be flared and contracted at a corresponding angle, so that the end of the one pipe may be inserted into the other without the trouble usually attending the fitting of stove pipes. Fig. 1 shows the hollow cone employed in expanding the end of the pipe; Fig. 2 shows the manner in which the pipe is contracted. The wooden plug which is inserted whenever it is necessary to drive the cone is shown in both figures.

Further information in regard to this invention may be obtained by addressing N. C. Pettit, Waldo, Fla.

Cooking by Gas.

Let me put on record the result of some experiments made with gas ovens, which will be of interest to all. It is generally acknowledged, without question, that an oven lined with slag-wool is the best, because it is supposed "to save 40 per cent of gas," and do other wonders. Now, the average cost of gas for oven work in a private house will not exceed, at the most, about 15 or 20 cubic feet per day. A saving of 40 per cent on this, even if it existed in practice, would not be particularly important to any one except the very poorest. I took a common cast-iron oven, 16 inches square and 20 inches deep, weighing 1 cwt. 2 qrs. 15 lb., and inserted an ordinary Bunsen ring of good construction in the bottom. With free ventilation and a gas consumption at the rate of 14 cubic feet per hour, I obtained the following temperatures in the center of the oven:

In 3 minutes....... 250° Fahr.
" 5 " .... 300° "
" 8 " .... 360° "
" 12 " .... 400° "

With a consumption of less than 2 cubic feet of gas, I got up a common heavy cast-iron oven—freely open to the air, and not jacketed in any way—to a first rate heat for pastry, and in perfect working condition. It is evident that such an oven, of good capacity, can be heated to a good temperature for roasting meat, every day for a week, for a cost of one halfpenny or less per week. These experiments were made with an oven in practical working condition, with three strong shelves, one being between the burner and the thermometer. The result can, I think, easily be accounted for by the fact that iron does not take up heat at all readily or quickly, and makes a good retainer of heat. The outside of the oven is a long time before it becomes even warm to the hand.

The Effect of Tobacco on Children.

Dr. G. Decaisne has submitted to the Society of Public Medicine the results of some interesting observations concerning the effects due to the use of tobacco among boys. Thirty-eight youths were placed in his charge, whose ages varied from nine to fifteen, and who were in the habit of smoking, though the abuse of tobacco varied in each case. The effects of course also varied, but were very emphatic with twenty-seven out of the thirty-seven boys. With twenty-two patients, there was a distinct disturbance of the circulation, bruit at the carotids, palpitation of the heart, deficiencies of digestion, sluggishness of the intellect, and a craving, more or less pronounced, for alcoholic stimulants. In thirteen instances there was an intermittent pulse. Analysis of the blood showed in eight cases a notable falling off in the normal number of red corpuscles. Twelve boys suffered frequently from bleeding of the nose. Ten complained of agitated sleep and constant nightmare. Four boys had ulcerated mouths, and one of the children became the victim of pulmonary phthisis, a fact which Dr. Decaisne attributed to the great deterioration of the blood produced by prolonged and excessive use of tobacco. As these children were all more or less lymphatic, it was not possible to establish a comparison according to temperament; but of course the younger the child the more marked were the symptoms, and the better-fed children were those that suffered least. Eight of the children in question were aged from nine to twelve years. Eleven had smoked for six months, eight for one year, and sixteen for more than two years. Out of eleven boys who were induced to cease smoking, six were completely restored to normal health after six months, while the others continued to suffer slightly for a year. Treatment with iron and quinine gave no satisfactory result, and it seems tolerably evident that the most effective, if not the only cure, is to at once forswear the habit, which to children in any case is undoubtedly pernicious.—*Lancet.*

Centrifugal Force.

Professors Ayrton and Perry exhibited at a recent meeting of the Physical Society an ingenious lecture apparatus for demonstrating the laws of centrifugal force. As was properly pointed out by Professor Ayrton, the ordinary lecture apparatus of this kind do not really demonstrate the laws of the subject, but simply show the effect; and a new and more scientific class of apparatus is demanded by the extension of scientific teaching. Professor Perry and he had been engaged in designing new apparatus to meet the wants of their City Guilds students, and the apparatus shown was one of the instruments in question. It consists of a rotating vertical axis carrying an aneroid chamber filled with mercury, which also rises in a graduated capillary tube projecting from its middle. A metal arm projects at right angles from the aneroid or diaphragm side of this chamber, and carries a sliding weight which can be shifted to different distances on the graduated arm. On rotating the axis the centrifugal force of the projecting arm pulls on the elastic diaphragm of the mercury chamber, and the mercury within it having more room sinks in the capillary tube by a corresponding number of degrees. The apparatus is capable of demonstrating the law of centrifugal force with accuracy, according to experiments which have been made; and, as Professor Guthrie remarked, it could be used for indicating the speed of wheels and shafts. We may add that there is already a mercury counter in existence, in which a closed mercury chamber is rotated, and the parabolic concavity given to the mercury by the centrifugal force is employed to measure the speed.

Proposed $50,000 Prize for a Gas Engine.

At the recent meeting of the Gas Institute, Sheffield, Eng., Mr. Thomas Warrington read a paper relating to suggestions for increasing the consumption of gas, in which he said:

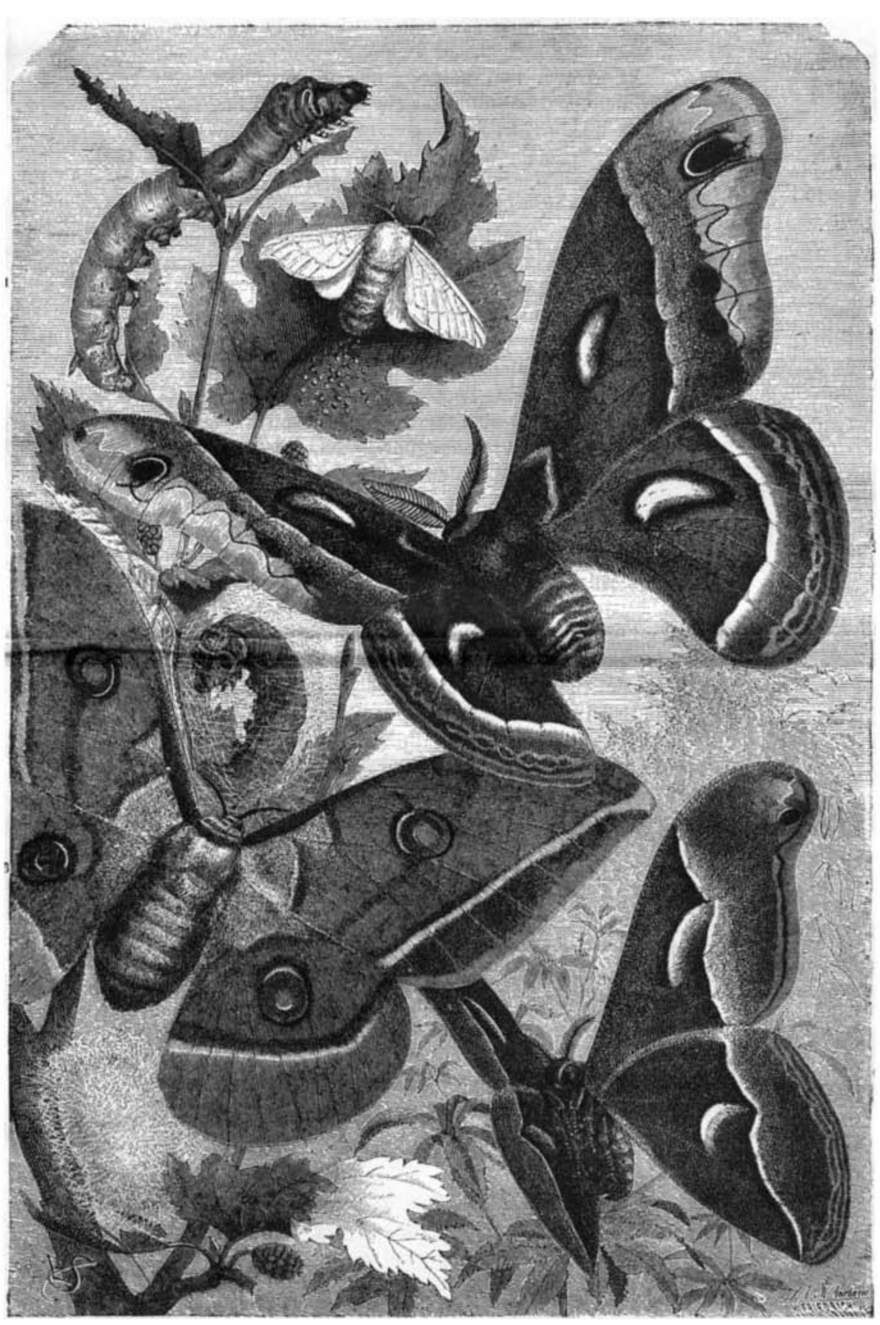
"A good source of profit is the consumption for gas engines; but the use of these is at present limited by their excessive first cost. So long as a steam engine can be fixed for half, or less than a half, the first cost of a gas engine, the latter is too heavily handicapped; and I offer it as a crude suggestion, that the gas companies should jointly copy the system of the Society of Arts, and offer a prize well worth having for a gas engine, satisfactory in all points, which should cost no more to fit up than a steam engine. A prize of £10,000 would be exceedingly well expended on this, and would be a trifle to each subscriber to the fund. It would certainly make a move in gas engines, and stir up the makers in an astonishing way; and a subscription of about £7 from each gas works would cover the total cost.

SILKWORMS AND MOTHS.

The various silk producing moths belong to the family Bombycidæ; upward of forty varieties of these moths may be found in various parts of the world.

"These insects secrete the silk in two large intestine-like vessels in the interior, which contain a gelatinous like substance and become very large before the caterpillar changes into a pupa. Both the silk organs unite in a common tube at the mouth called the spinneret, and through this tube the semi-liquid is ejected. When it comes in contact with the air, it hardens. The caterpillar employs the silk for a cocoon which it gradually forms into an oval shape. The outermost layers are rough and are stripped off before the thread is spun into a hank."

As the most beautiful singers among the birds are clothed in the plainest dress, so with the most useful of all the butterflies, the "mulberry silk spinner." The breadth of the wings is from forty to forty-five millimeters. It is a mealy white color, and the double row of serrations on the antennæ are black. The anterior wings have a crescent shaped point in the deeply curved edges. A yellowish brown crossline is also visible. The caterpillar called the "silk worm" is the most perfect of all the spinners. It is grayish white and has brown and reddish yellow spots on the back. Its only nourishment is the leaves of the mulberry tree. The cocoon is egg shaped, and the loose silken threads surrounding it are either white or yellow.



1.—MULBERRY SILK WORM AND MOTH. 2.—SOUTH AMERICAN SILK SPINNER. 3.—CHINESE SILK SPINNER. 4.—AILANTUS SILK SPINNER.

In all probability the silk worm came originally from China, the native country of the mulberry tree. In the reign of the emperor Justinian two Persian monks smuggled into Constantinople some mulberry plants and eggs of the silk worm, which they had stolen and concealed in their hollow walking sticks. The culture of silk worms has been carried on in Europe since 520 A.D. It was introduced into Greece in the twelfth century, and from Greece was carried through Arabia and into Spain.

In the middle of the twelfth century, through the war which Roger II. carried on with the Byzantine Emmanuel, silk culture was introduced into Sicily and extended to Florence, Milan, and the rest of Italy. In the reign of Henry IV., it was introduced in France, and from there extended farther north. In 1670 the first company for the culture of the silk worm was formed in Germany. Frederick the Great himself introduced this branch of industry in his kingdom, and in the second half of the sixteenth century silk culture had found an entrance everywhere in Germany. The war for freedom gave a blow to this new industry, for the times were not suited to the culture of the worms or the plucking of mulberry leaves. The trees became old, did not increase, and were scarcely valued except by the village youths who ate the sweet fruit. In later times the subject was again agitated, and in Prussia was regarded very favorably. Mulberry hedges were planted, as they furnished the leaves more speedily and conveniently than the trees. Then came the news from the silk producing countries of southern Europe of the appearance of disease among the silk worms, and at the present day, in proportion to the demand for silk, there is comparatively no silk produced.

The Chinese oak silk producing moth has yellowish brown wings, with a fine white line passing through them, bordered on the inside by a slender brown line, with crosslines of brown. On each wing there is a round dark spot broken by a white marking. Three days after pairing, the females lay their large brown eggs in heaps upon the sides of their dwelling place. Eight or ten days later the black caterpillars emerge from the eggs. After the second changing of the skin the worm becomes a yellowish green. In about fifty-two days they begin to spin.

The growing caterpillar is distinguished from the very similar Japanese silk spinner by a brown, dark spotted head, which gives it the name of the "brown headed oak caterpillar." It eats night and day with only a short intermission. This butterfly has in its native country, as with us, two broods in a year. After a report made by Abbe Paul Perny of the province of Kuy Tscheu, to the Parisian Company, the second brood with the pupas were kept through the winter in rooms, and the temperature was carefully regulated day and night. The females were placed in willow baskets, where they laid their eggs. After the caterpillars came out of the eggs, oak branches were put in the baskets. As soon as they could crawl, they were transferred to an oak forest which consisted only of an undergrowth; the ground was kept clean, so that the down falling worms could be easily picked up. For this purpose, and in order to frighten away the birds, a watchman was provided for each colony.

In forty or forty-five days after the caterpillars emerge from the eggs the cocoon harvest commences. The best ones are sought out for further breeding. The rest are placed upon bamboo hurdles and a fire built beneath them, to put the pupa to death. They are then placed in a vessel of boiling water for from eight to ten minutes. Then two handfuls of buckwheat ashes are put in a bowl of water, and the mixture added to the boiling water in which the cocoons are placed.

The Chinese dry the stalks of the buckwheat in the sun, after the grain is harvested, and set fire to the heap. The ashes are supposed to have the same effect as potash. The cocoons are then moved around with a spatula until the threads are loosened and wound around the spatula. Then five or eight threads, according to the strength desired, are placed in the opening of a reeling machine, and the cocoon is wound off. The second brood is treated in the same way as the first. The Chinese reap a rich profit from these silk spinners. The silk is firmer and cheaper than that of the mulberry spinners.

The ailantus silk worm feeds upon the leaves of the ailantus tree. Rearing this moth is easy, as the caterpillars remain upon the tree and spin their cocoons in the branches. The color of the caterpillar is greenish yellow marked with black. The ground color of the moth is a velvety reddish brown, the bands white; the edge of the crescent-shaped spot is yellowish. The worm is hardy and not subject to many diseases to which the silk worm is liable, and seems to be free from the fungoid parasite which often destroys so many silk worms. The silk is strong, but does not have much gloss.—*From Brehm's Animal Life.*

Coal Gas and Water Gas.

In response to a resolution of inquiry from the Board of Aldermen of Brooklyn, N. Y., as to the relative qualities inimical to health of coal gas and water gas, a report has been made containing analyses and statements by Professor Ira Remsen, of the Johns Hopkins University, who says that coal gas contains 7·9 of carbonic oxide in 100, and water gas 28·25 parts to the 100. Carbonic oxide is a deathly gas, and either of these illuminating gases, if inhaled in sufficient quantities, would produce death, but long before enough of either to produce bad effects could accumulate in a room, it would necessarily be detected by its odor. In case the occupants of the room were asleep, it was possible a fatal effect might be reached a few minutes earlier in the case of water gas than in that of coal gas.

A SIX-POUND pickerel, caught near Shelby, Iowa, had attached to it a complete set of fishing tackle, except the pole.