IMPROVED BRICK MACHINE.

In the manufacture of bricks, a class of machinery is required which will not only turn out bricks perfectly and rapidly, but will also be capable of resisting the wear and strain naturally coming on such machines, and be entirely free from liability to disastrous breaks.

Mr. W. E. Tallcot, of Croton Landing, N.Y., the inventor of the machine shown in the annexed engraving, having had many years of practical experience in the manufacture of bricks and brick-making machinery, and having seen the defects of former machines, and knowing the requirements of a really good brick machine, invented, patented, and perfected a very successful machine, provided with safety devices at every point where breakage would be likely to occur. Mr. Tallcot being located on the Hudson River, in the great brick-making center of the United States, has had excellent opportunities for studying the requirements of this industry, and his efforts have resulted in the construction of the machine shown in our engraving. It is made wholly of iron, the base frame being a strongly arched and ribbed casting, having broad feet, which are secured to a suitable foundation. The tempering-mill cylinder, A, is bolted to the base frame, and contains a tempering shaft, B, carrying a number of iron arms arranged spirally, and having at the lower end a sweep, shown in detail in Fig. 2. The tempering cylinder is made of large size, giving the machine perfect tempering capacity, which is very important in the manufacture of a fine quality of brick.

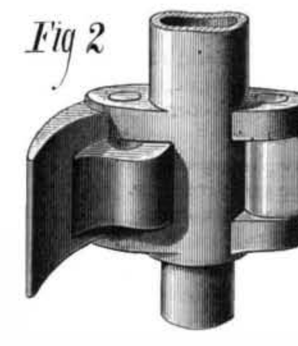
The upper end of the shaft, B, carries a large bevel wheel, and is journaled in a strong iron frame secured to the top of the tempering cylinder, A. This frame supports the horizontal driving shaft, also the shaft which operates the pressing mechanism, and it serves to keep all of the main driving parts accurately in line.

The press box, C, attached to the front of the tempering cylinder, contains a plunger which is driven through a forked connecting rod from the rock shaft, D, which receives its motion from a crank on the end of the shaft, E. This connecting rod straddles a standard which is secured to the packer or plunger. In the lower end of the connecting rod there is fixed a pin which passes through both branches of the fork and through a vertical slot in the standard. This pin acts against a cast iron press-pin which passes from the front across the vertical slot in the standard, thereby giving the proper downward motion to the plunger. The plunger is raised by the upward movement of the connecting rod. The press pin may be placed in different holes in the standard to vary the throw of the plunger, and when an extraordinary strain is exerted on the cast iron pin, by the entrance of a large stone or other hard body into the presser box, the cast iron pin breaks and relieves the other parts of the machinery.

The clay which is tempered in the cylinder, A, is forced by the sweeps into the presser box, and is pressed downward by the plunger through rectangular openings in the bottom of the presser box, C, into moulds resting on the table, I, below the presser box. At proper intervals, and timing with the other parts of the machine, the levers, F, move forward, carrying a rod which pushes an empty mould forward against the filled one, forcing the latter out on the table, I, and putting the empty one in its place. The movement of the levers, F, is effected by a cam on the end of the shaft, E, through an angled lever, H, and connecting rod, G. This connecting rod is jointed at its lower end to a hooked arm, K, which engages the end of a cast iron breaking rod held by an arm on the rock shaft carrying the levers, F.

The object in using the cast iron rod is to avoid the breakage of moulds and of the mould moving mechanism should a stone or other hard body partly enter the mould during the process of pressing. An additional safety appliance is seen in the front of the presser box, the lower portion of which consists of a gate or mouth piece pivoted at each end and extending the whole length of the clod cutter. This mouth piece is held in position by a vertical spring having a hooked end, which engages in the end of the arm, L. Dur-

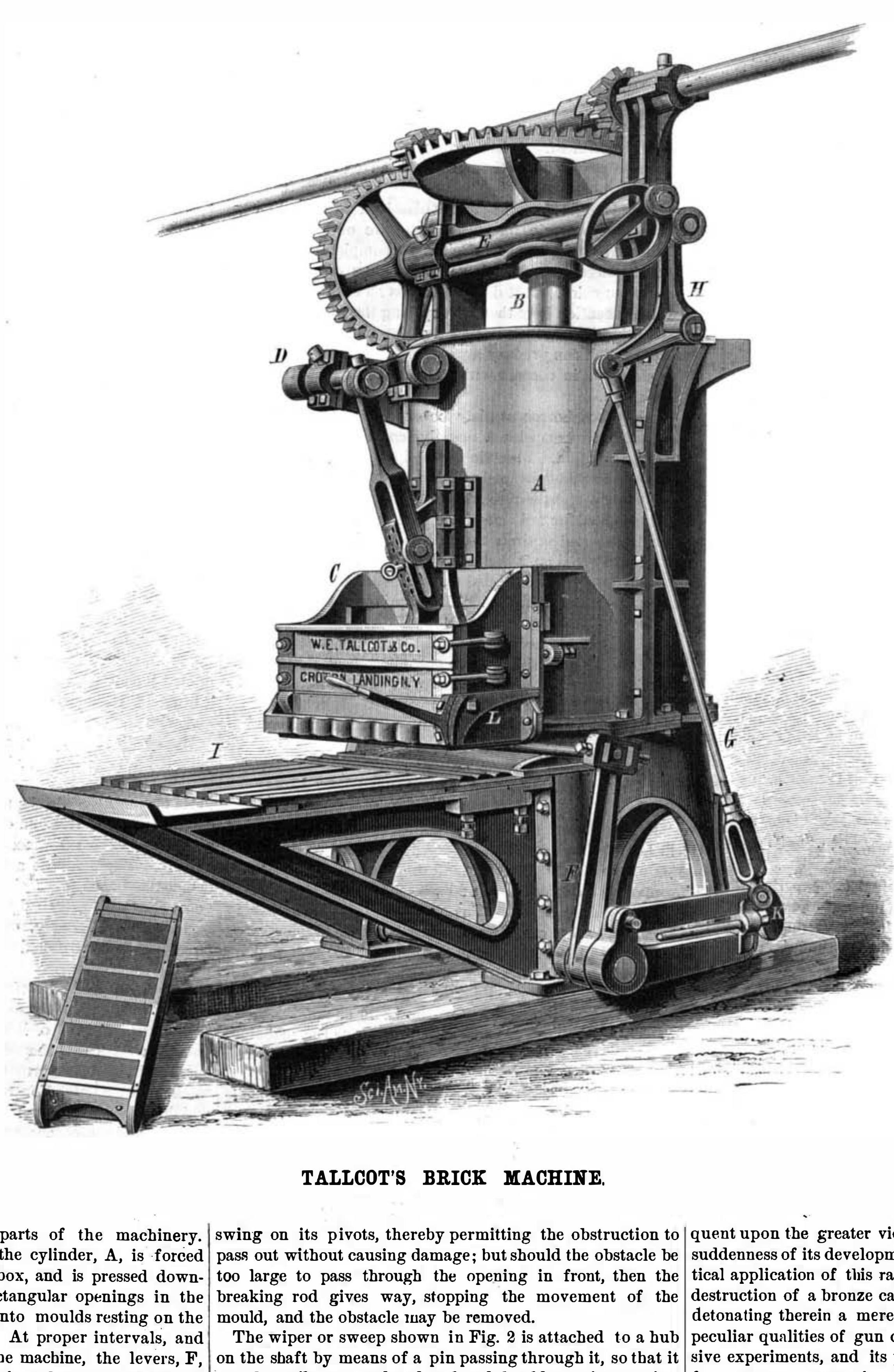
Fig 2



ing the movement of the mould should a stone or other obstacle come in contact with this mouth piece, the arm, L, slips by the hooked spring, allowing the mouth piece to swing on its pivots, thereby permitting the obstruction to pass out without causing damage; but should the obstacle be too large to pass through the opening in front, then the breaking rod gives way, stopping the movement of the mould, and the obstacle may be removed.

The wiper or sweep shown in Fig. 2 is attached to a hub on the shaft by means of a pin passing through it, so that it may be easily removed and replaced should occasion require. It requires eight men and a boy to run one machine having a capacity of 84 bricks per minute. The bricks are turned out square, with well defined edges, and are of fine quality.

These machines may be seen in daily use at Croton Landing. Further information may be obtained by addressing Messrs. W. E. Tallcot & Co., Croton Landing, N.Y.



TALLCOT'S BRICK MACHINE.

SNOW for PACKING FISH.—During the past winter Mr. F. P. Noble, of Carleton, New Brunswick, tried the experiment of storing snow for use in packing fish for transportation. He had three houses filled, and it is proving at once cheaper and less troublesome than ice for the purpose intended.

Experiments with Explosives.

Professor F. A. Abel, C.B., F.R.S., chemist to the British War Department, lately conducted a series of interesting and remarkable experiments on the proof grounds in the Government marshes adjoining the Royal Arsenal, Woolwich, in the presence of many spectators, including a number of officers and cadets of the Royal Navy. Professor Abel began by explaining that the violence of action of an explosive substance is regulated by the resistance opposed to the escape of the gases at the first ignition; and, furthermore, that the partial confinement of the disengaged gases by the mass of the explosive alone is sufficient to develop violent explosion. These examples he proceeded to illustrate by the first series of experiments, showing that gunpowder, and even so powerful an agent as mercurial fulminate, when ignited on the surface, produced a mild report in comparison with the result of similar charges ignited at the base of the heap. The next experiments were devoted to an exposition of the theory of detonation, the development of which, the professor said, was dependent upon the nature, quantity, and confinement of the detonator in relation to the nature and mechanical condition of the substance to be detonated. Thus twenty-five grains of mercurial fulminate exploded unconfined upon a mass of dynamite left the latter unimpaired, whereas only one grain of fulminate strongly confined produced detonation, and the dynamite was thereby exploded. Similar experiments were tried with corresponding results with gun cotton, loose and compressed, and other compounds, and then Professor Abel, having laid down the axiom that rigidity of the mass is essential to detonation, proved further that the facility and completeness with which detonation is transmitted from particle to particle of a mass of explosive material is regulated by the rigidity in the resistance to mechanical motion which the particles offer. The most perfect explosive agent known to modern science was nitro-glycerine, employed through the medium of some suitable absorbent, one of the best of which was collodion gun cotton, as used by photographers. A new compound of nitro-glycerine and an absorbent had recently been produced under the name of blasting gelatine, and this was pronounced to be the most violent explosive known to science. This gelatine, however, dispersed with little effect when fired in its ordinary state; but when solidified by freezing, which was easily accomplished, it destroyed the iron plate upon which it stood. The difference between explosion and detonation was next lucidly demonstrated. An open case containing five pounds of powder was placed upon an iron plate and exploded, but the plate was scarcely damaged; a similar quantity of gun cotton suspended four feet above the plate, however, completely crushed it, consequent upon the greater violence of the detonation and the suddenness of its development and transmission. The practical application of this rapid violence was displayed by the destruction of a bronze cannon by filling it with water and detonating therein a mere morsel of gun cotton. Various peculiar qualities of gun cotton were illustrated by successive experiments, and its power of transmitting detonation from one mass to another, as well as its rending capacity as distinguished from mere displacement, were evidenced in a startling manner by the destruction of a strongly-constructed stockade of heavy balks of timber, the tops of which were cut off level with the ground and thrown to a considerable distance. Other experiments followed, in which the efficiency and convenience of wet gun cotton were exemplified; and, in conclusion, a charge was detonated under water, throwing up a pyramid of spray to a great height.

Mr. Brown, assistant to Professor Abel, arranged the charges and fired them by electricity, and instantaneous photographs of the most remarkable displays were taken by the photographers from the Chemical Department of the Royal Arsenal.

NEW THERMO-ELECTRIC BATTERY.

BY M. A. NIAUDET.

This battery is frequently used and is much appreciated in Austria and Germany. It is made of different forms, of which the most recent, represented by Fig. 1, appears to us to be the best, since it requires only two Bunsen burners to set in action forty thermo-electric elements. There is another model of sixty elements, with three burners, which offers the same advantages as the one represented.

Each circular group of twenty elements should be separately considered. The following is the description of such a group:

The elements are arranged in a horizontal plane, and radially; the heated junctions being towards the center of the circle, and the cooled junctions at its circumference.

The two metals are: 1st. German silver (called *maillechort* in France and *neu Silber* in Germany), and, 2dly, an alloy of antimony and zinc, which fuses at a temperature slightly higher than the melting point of antimony.

These two metals are soldered (at least at the heated junction) without the intermediary of any other metal; the ends of the German silver wires pass into a little capsule of brass, which forms the bottom of the mould in which the other metal is cast. This capsule is shown at *c*, in Fig. 2, which represents two elements of the actual dimensions; it remains attached to the element and forms part of the apparatus.

Into the same capsule penetrates a small rod, *r*, of copper, the extremity of which is also enveloped by the cast metal; and by means of this rod the heat is conducted to the heated junction. The extremities of these copper rods are arranged in a small circle, and are held between two circular plates of mica, so that they all become heated by the same flame. In the apparatus shown, a Bunsen burner is adopted; but in some simpler apparatus the flame of a spirit (wood naphtha) lamp is used. The mica plate has the effect of concentrating and directing the heat of the flame on to the copper rods.

The object of using the copper rods at the heated junction will be seen from the following: The heated junction does not obtain its heat directly from the flame, but only through the intermediary of the copper rod; it is therefore protected against any accident through overheating, that is, against the fusion of the alloy, which would cause the immediate break down of the battery.

To avoid, at least partially, the loss of heat by radiation, these copper rods are inclosed, excepting at their extremities, within a small tube, shown at *t*, in Fig. 2. The cooled junction is altogether dissimilar; the fusible metal is here soldered to a plate of copper, to which is soldered the German silver wire of the next element. The plate of copper is of large surface, forming a cylinder through which the air circulates, with the production of a cooling effect.

These batteries have been subjected to careful experimental trial by M. Waltenhofen, of Prague; he has compared them with that of Marcus, and has found them to be much superior to it.

It was found in the previous experiments of M. Stefan, of Vienna, that the thermo-electric elements of Marcus may obtain an electromotive force of one-eighteenth volt, but this maximum is obtained only at a temperature close upon the fusing point of one of the alloys of which they are formed.

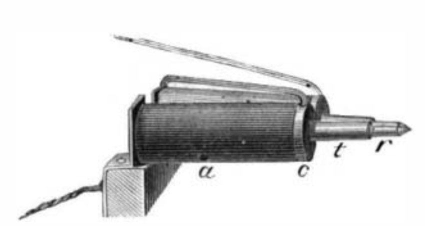
Under similar conditions, M. Waltenhofen found that the Noë elements possess an electromotive force between one ninth and one tenth volt.

In practice, these maxima, or anything near them, cannot be depended upon, and, when several elements are connected in series, they are never attained, because the elements are never equally heated. For ordinary experiments we may calculate upon one sixteenth volt per element. The resistance of each element is one fortieth Siemens' unit.

An improvement which is supplementary, but very useful in practice, consists of the addition of a regulator of the pressure of gas, by means of which any overheating, and the accidents which ensue from it, are avoided. It formerly sometimes happened that an unexpected increase in the gas pressure produced some fusion of the metal, and thus deteriorated the battery.

The safety apparatus here referred to, and which is shown in the front part of Fig. 1, consists of a glass bottle containing water, and closed by a cork. Two tubes enter this bottle through the cork; one, B B, is a branch from the gas supply, and passes to the bottom of the vessel; the other, H, does not reach the surface of the water. Its use is to lead away any gas passing into the bottle, and to conduct it to the small gas jet, I, which is kept constantly lighted. If the pressure of gas be low, the tube, B, is closed by the water; if it should become too great, the gas bubbles through the water and escapes at G, where it

FIG. 2.



inflames. The apparatus thus constitutes a safety valve, preventing the pressure from rising above a certain degree, which can be regulated at will. The gas which escapes, being at once consumed, cannot give rise to accident.

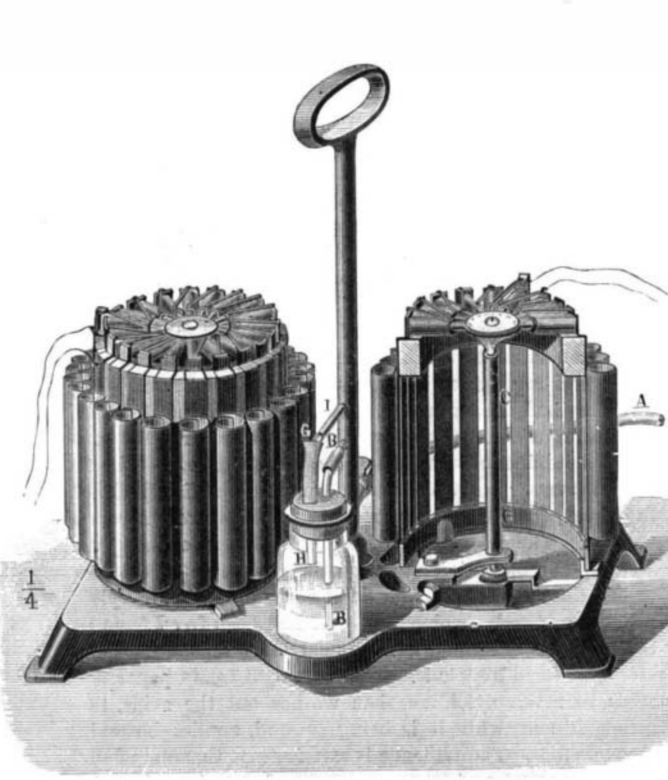


FIG. 1.—THERMO-ELECTRIC BATTERY OF M. NOE.

With a battery of twelve elements, it is possible to work an electric bell; with twenty elements, water may be decomposed in the voltameter; with forty elements, a secondary battery of Planté may be charged, or an induction coil worked. In a word, these batteries allow of most of the experiments in physics, and small industrial operations, gilding, plating, nickeling, etc., being carried into effect.

One great advantage of this kind of electro-motor is that it is set in full action in one or two minutes, and all expenditure ceases the moment the current is no longer required. Lastly, and this is the most important point, the battery undergoes no alteration by use, as in the case of those which have preceded it, and which in a short time show a considerable internal resistance, and a corresponding diminution of effect.—*La Nature.*

THE CARP AND ITS CULTURE.

In the accompanying engraving we reproduce a careful drawing of the mirror carp (*Cyprinus carpio specularis*), so called on account of the large scales which run along the sides of the body. This is one of the three races of carp recently introduced into this country, the other two being the scale carp and the leather carp, the one entirely covered with scales, the other having few or none.

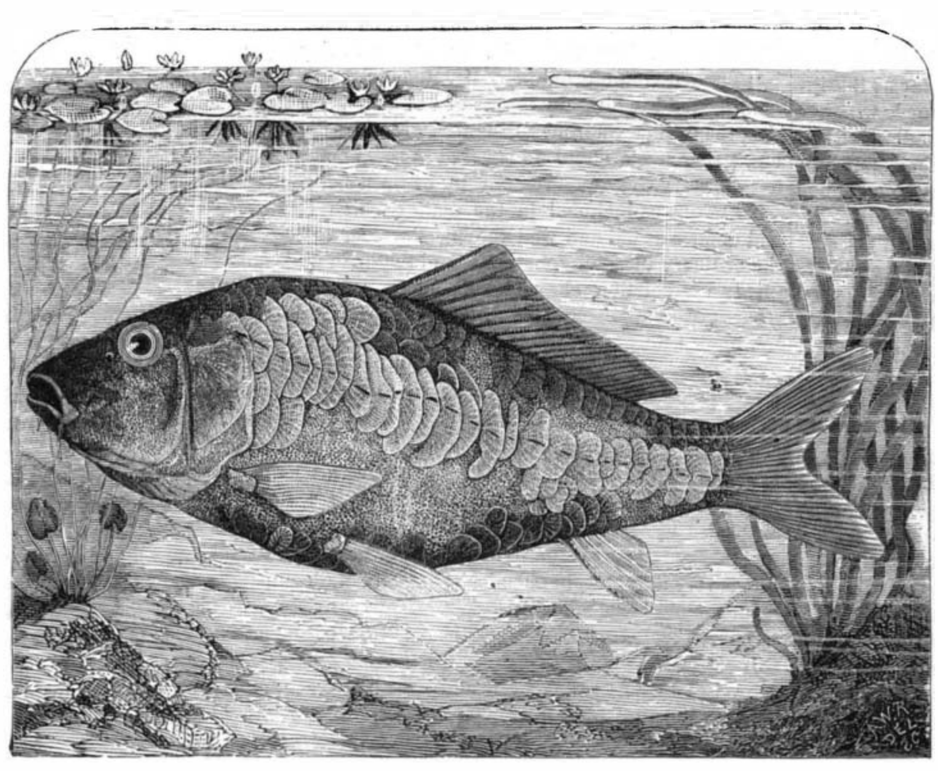
Three years ago the national carp ponds were established at Washington, in the old swamp and canal near the monument, and many thousand young fish have since been distributed for stocking suitable waters in Kansas, Nebraska, Missouri, Ohio, Indiana, Illinois, Pennsylvania, Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Louisiana, Texas, Tennessee, Kentucky, and New York. Persons desiring them for such purpose can be supplied on application to Prof. S. F. Baird, U. S. Fish Commissioner, Washington, D. C.

In a recent communication Professor Baird expresses great faith in the future of this new fish. He is quite well satisfied that within ten years it will constitute a very prominent portion of the animal food of the country. Although scarcely known in the United States, and but little more, as an article of extended application, in England and France, the carp is in Germany and Austria cultivated to the highest degree, so as to constitute a notable article of the market supply.

The fish itself is probably of Asiatic origin, and has been domesticated in China for thousands of years. It has, however, been so extensively distributed in Europe as to have become, in a measure, a native fish, occurring in public waters as well as in private enclosures. It is, Prof. Baird remarks, emphatically a farmer's fish; and may safely be claimed to be, among fishes, what chickens are among birds, and pigs and ruminants among mammals. Its special merits lie in its sluggishness and the ease with which it is kept in very limited enclosures, it being a vegetable feeder, and its general inoffensiveness. Trout and black bass require abundant water and a supply of animal food for their sustenance and growth; the carp thrive in shallow ponds, and while not disdaining flies, worms, larvæ, etc., live on the succulent roots and leaves of aquatic plants, seeds as they fall into the water, and other similar substances, and may be fed very readily upon corn, grain, bread, root crops, raw or boiled, and, indeed, any vegetable refuse.

Their rate of growth, too, is something marvelous, and as observed so far in the specimens introduced into the United States, is even more remarkable here than in Europe. Among the original fish imported by the Fish Commission from Europe, and which are now only about three and a half years old, are some from twenty-five to thirty inches in length, weighing from four to eight or nine pounds.

The carp thrives best in artificial or natural ponds with muddy bottoms, and such as abound in vegetation. In large ponds it may not be necessary to furnish any special food, but in restricted enclosures, as, for instance, those of a fraction of an acre, they may be fed with the refuse of the kitchen garden, leaves of cabbage, lettuce, leeks, etc., hominy, or other substances. Grain of any kind is generally boiled before being fed to the fishes, but this is probably not absolutely necessary. The refuse of malt from breweries makes excellent food for them.



THE CARP AND ITS CULTURE.

The Washington ponds are arranged so that they can be drawn off at will, leaving all the fish collected in a small basin near the outlet. This is for convenience in assorting the fish, and for selecting such as are needed for other purposes.

It is a prime necessity that there be no predaceous fish in the same pond with carp. Of course, the larger fish will be measurably secure against the attacks of carnivorous species of about the same size, but the eggs and young will become a prey to the rapacity of such associates. As a general rule the fish will thrive best when they are the sole occupants of particular waters, although the association of suckers and chubs would be less objectionable than that of sunfish, perch, or black bass.

The carp spawn in the spring, in May and June, and indeed, under some circumstances, throughout the entire summer. The Fish Commission have young fish that spawned from May to September. They are very prolific, yielding from 400,000 to 500,000 eggs, according to size. The eggs adhere tenaciously to whatever they touch, and for that reason it is very important that a new pond should be provided with floating weeds for such attachment. The eggs hatch out in a few days, and the young grow very rapidly. They feed voraciously upon the so called frog spittle, the green alga scum so common in