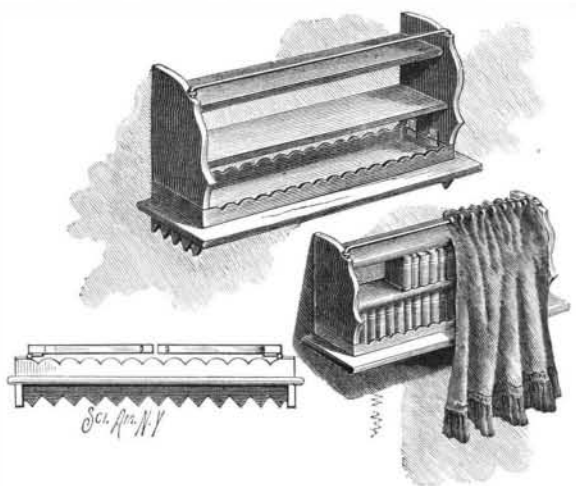
AN IMPROVED FOLDING BOOK CASE.

A folding book case designed to have a certain amount of rigidity is illustrated herewith, and has been patented by Mr. Phillip Kaffenberger, of Springfield, Mo., the small figure being a front view showing the hinged parts in their folded position, without the removable shelves. The case is made with a permanent



KAFFENBERGER'S FOLDING BOOK CASE.

board or bottom shelf, to which short side pieces are permanently attached, and folding side parts hinged thereto, grooved to receive the shelves. The bottom board has strips supported thereon or pendent therefrom, which may serve as ornaments or as receptacles for the removable parts during transportation or storage. A tie rod is used to connect the ends of the side parts at the top, this rod also serving as a curtain rod.

MAKING CARBON RODS AND PLATES.

BY GEO. M. HOPKINS.

Carbon rods and plates of the finest quality can be made economically only by the use of expensive machinery and apparatus, such as pulverizing mills, hydraulic presses, and retorts or ovens; but the amateur, without a great deal of trouble, and with very little expense, can make carbon plates and rods which will answer a good purpose. The materials required are coke, wheat flour, molasses or sirup, and water. The tools consist of a few moulds, a trowel or its equivalent for forcing the carbon mixture into flat moulds, tubes to be used as moulds for carbon rods, and ramrods for condensing the material in the tubes and forcing it out, and an iron mortar or some other device for reducing the coke to powder.

Clean pieces of coke should be selected for this purpose, and such as contain no volatile matters are preferred. The coke is pulverized and passed through a fine sieve. It is then thoroughly mixed with from one-sixth to one-eighth its bulk of wheat flour, both being in a dry state. The mixture is moistened with water (or water with a small percentage of molasses added) sufficiently to render it thoroughly damp throughout, but not wet. It should now be allowed to stand for two or three hours in a closed vessel to prevent the evaporation of the water. At the end of this time the mixture may be pressed into moulds of any desired form, then removed from the moulds and dried, slowly at first, afterward rapidly, in an ordinary oven at a high temperature. When the plates or rods thus formed are thoroughly dried, they are packed in an iron box, or, if they are small, in a crucible, and completely surrounded by coke dust to exclude air and to prevent the combustion of the plates or rods during the carbonizing process. The box or crucible must be closed by a non-combustible cover and placed in a furnace or range fire in such a way as to cause it to be heated gradually to a red heat. After the box becomes heated to the required degree, it is maintained at that temperature for an hour or so, after which it is removed from the fire and allowed to cool before being opened. The rods or plates are then boiled for a half-hour in thin sirup or in molosses diluted with a little water. They are again baked in an ordinary oven and afterward carbonized in the manner already described. This latter process of boiling in sirup and recarbonizing is repeated until the required density is secured.

As some gases are given off during carbonization, it is necessary to leave the box or crucible unsealed to allow these gases to escape.

Fig. 1 shows an inexpensive form of mould for flat carbon plates. It consists of two right-angled pieces of wood of the thickness of the carbon plate to be made, and a thick plate of sheet iron. The iron should be oiled or smeared with grease before the mould is filled. The carbon and flour mixture is pressed into the mould smoothly, the wooden pieces are removed, and the carbon is left on the iron plate to dry. When dry, it is easily separated from the plate and may be handled without danger of breaking.

Cylindrical carbon rods may be formed in a wooden mould, as shown in the background of Fig. 1, and dried in a grooved iron plate adapted to receive them, or a brass tube may be used as a mould, as shown in Figs. 2 and 3. To facilitate the filling of the tube, a funnel may be formed on or attached to one end. The tube may be filled with carbon entirely from the top, or it may be partly filled by forcing its lower end several times down into the carbon mixture, finishing the filling at the top. The lower end of the tube is placed on an iron plate and the contents are rammed from time to time during the filling operation. When the tube is filled, it is discharged in the manner illustrated by Fig. 3, *i. e.*, by pulling it over a fixed rod while its discharge end delivers the carbon cylinders to the iron plate on which they are to be dried and baked preparatory to carbonization. The plate in this case should be oiled to prevent the adhesion of the rods. The rod by which the contents of the tube are ejected should be on a level with the top of the iron plate. Fig. 4 shows in section an iron box containing plates and rods packed ready for carbonization.

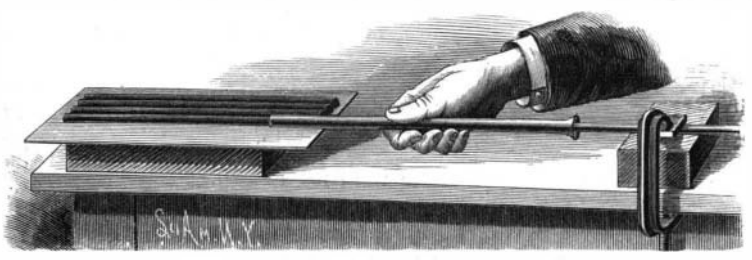


Fig. 3.—DISCHARGING THE MOULD.

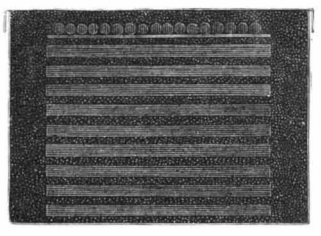


Fig. 4.—CARBONIZING BOX.

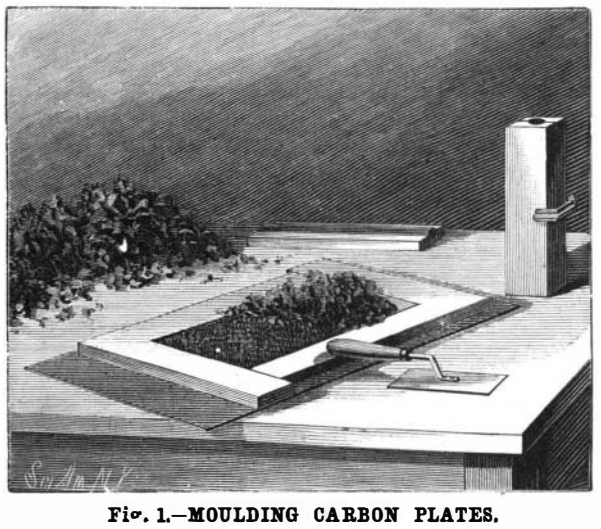


Fig. 1.—MOULDING CARBON PLATES.

Fig. 2.—MOULDING CARBON RODS.

Substances Liable to Spontaneous Combustion.

Cotton-seed oil will take fire even when mixed with 25 per cent of petroleum oil, but 10 per cent of mineral oil mixed with 10 per cent of animal or vegetable oil will go far to prevent combustion.

Olive oil is combustible, and, mixed with rags, hay, or sawdust, will produce spontaneous combustion.

Coal dust, flour dust, starch, flour (especially rye flour) are all explosive when mixed with certain proportions of air.

New starch is highly explosive in its comminuted state, also sawdust in a very fine state, when confined in a close chute and water directed on it. Sawdust should never be used in oil shops or warehouses to collect drippings or leakages from casks.

Dry vegetable or animal oil inevitably takes fire when saturating cotton waste to 180° F. Spontaneous combustion occurs most quickly when the cotton is soaked with its own weight of oil. The addition of 40 per cent of mineral oil (density 0·890) of great viscosity, and emitting no inflammable vapors, even in contact with an ignited body, at any point below 338° F., is sufficient to prevent spontaneous combustion, and the addition of 20 per cent of the same mineral oil doubles time necessary to produce spontaneous combustion.

Patent driers from leakage into sawdust, etc., oily waste of any kind, or waste cloths of silk or cotton, saturated with oil, varnish, turpentine. Greasy rags from butter, and greasy ham bags. Bituminous coal in large heaps, refuse heaps of pit coal, hastened by wet, and especially when pyrites are present in the coal; the larger the heaps, the more liable.

Lampblack, when slightly oily and damp, with linseed oil especially. Timber dried by steam pipes, or hot water or hot air heating apparatus, owing to fine iron dust being thrown off; in close wood casings or boxings round the pipes, from the mere expansion and contraction of the pipes. —*American Miller.*

BAND CUTTER PLATFORM FOR THRASHING MACHINES.

The illustration herewith represents a simple construction of platform which may be conveniently and

LEEPER'S BAND CUTTER PLATFORM FOR THRASKING MACHINES.

expeditiously attached to the wheel of a thrashing machine, or the wagon carrying it, whereby the person cutting the bands of the grain may be provided with a firm and comfortable support. It is a patented invention of Mr. Alfred B. Leeper, of Owaneco, Ill. Upon the under side of the platform are two transverse brace bars, one of which has on its under face a semicircular recess adapted to conform to the contour of the wheel tire, and a clamp adapted to engage the wheel felly. To the other beam is hinged a brace bar, as shown in the sectional view, adapted to support the platform, its free end resting upon the hub of the wheel and bearing against one of the spokes, the bar having a recess to receive the spoke. This bar, when the platform is not in use, is folded up against its under side.

Beginning of Electrical Practice.

Mr. Deland has an article in the *Electric World* instructive to a large class of young persons who are seeking information as to the best means of learning the electrical trade.

He thinks that a young man who has evinced a taste for electricity can find no better opportunity of learning its practical applications than in the employ of a good electrical supply house, which carries in stock a large number of testing instruments and all the various apparatus which are in daily use in the different branches of electrical application. A training founded on a few years' experience in such a place must indeed be of considerable value to any one, no matter in what direction his later and cultivated energies may direct him, and we believe that not a few of our prominent electricians have at one time or another served an apprenticeship of this sort, which has been turned to good advantage later on.

A Cheap Telephone.

A correspondent in the *American Artisan*, who claims to have had considerable experience in that line, says a good working telephone may be made as follows: Make two tin drums six inches in diameter and four inches deep. They should have a heavy wire formed in same as half gal. cup. The wire should not be less that No. 9. Take rawhide that has been divested of hair and stretch it over the drum while wet, and bind it on with a small wire; let it remain till perfectly dry. A very thin hide, such as squirrel, cat, coon, is the best. Thick hide will not work well. Now, to erect your drum, wire, etc., having set your posts and put up your insulators, which may be made of wire and suspended from arms which have been nailed to the posts, bore a hole in the wall where the drum is to be placed, run the wire through your drum and through the rawhide in the center, having a button ready. Pass the wire through the eye of the button and back through the drum and twist tightly, letting the button go, resting it on the hide. Put up the wire at the different insulators (string loop suspenders) till it reaches the other end of the line; then proceed to do as at first. If the wire has been properly stretched and all the work has been done as it should have been done, you will have a good and cheap telephone. No. 18 copper wire for main line should be used.

The New Navy.

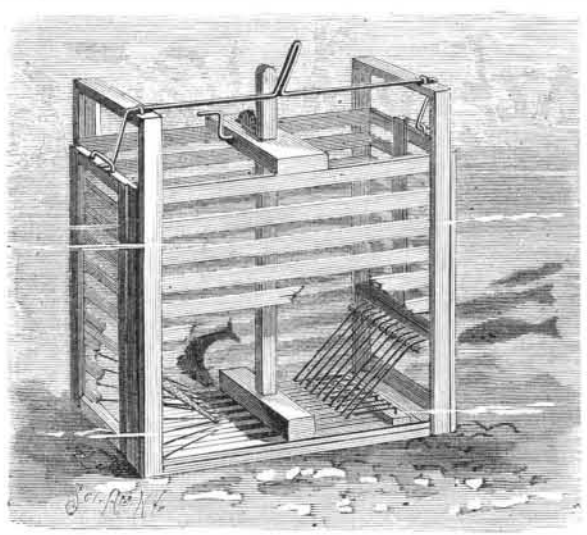
An interesting account of the new American navy is embodied in the annual report of the American Iron and Steel Association. All the vessels for the new navy, except five partly completed iron monitors, are or will be built of steel. After long delay the completion of these monitors has recently been authorized. Their keels were laid in 1874 and 1875. They are armored and double-turreted. Each monitor is to have four 10-inch breech-loading rifled guns in its main battery and several rapid-fire and Gatling guns in its secondary battery. The guns of the main batteries are all breech-loading rifles. Besides the main batteries, each vessel will be equipped with a secondary battery, which in nearly every ship will consist of several small rapid-fire guns, from 6-pounders down, revolving cannon, and from two to four Gatling guns. The vessels recently built or now building are:

Vessel.	Type.	Displacement. Tons.	Main Battery.
Texas	Belted	6,300	2 12-inch.
			6 6-inch.
Maine	Belted	6,648	4 10-inch.
			6 6-inch.
Chicago	Cruiser	4,500	4 8-inch.
			8 6-inch.
			2 5-inch.
Boston	Cruiser	3,189	2 8-inch.
			6 6-inch.
Atlanta	Cruiser	3,189	2 8-inch.
			6 6-inch.
Dolphin	Dispatch	1,485	1 6-inch.
Newark	Cruiser	4,083	12 6-inch.
Charleston	Cruiser	3,730	2 8-inch.
			6 6-inch.
Baltimore	Cruiser	4,413	4 8-inch.
			6 6-inch.
Philadelphia	Cruiser	4,324	12 6-inch.
San Francisco	Cruiser	4,083	12 6-inch.
Yorktown	Gunboat	1,700	6 6-inch.
Petrel	Gunboat	890	4 6-inch.
Concord	Gunboat	1,700	6 6-inch.
Bennington	Gunboat	1,700	6 6-inch.
Vesuvius	Cruiser	725	3 15-inch dynamite guns.
First class torpedo boat	Torpedo	99	8 automobile torpedoes.

The Texas has an armor 12 inches thick and the Maine one 11 inches thick. The other ships are unarmored. The building of a coast defense vessel of 4,000 tons displacement, four additional steel cruisers, and three gunboats has been authorized by Congress. When all the vessels enumerated above shall have been completed, the United States will have a navy of thirty-six iron and steel vessels, all, excepting the five monitors, built on the most approved modern plans. This fleet will consist of eighteen cruisers (including two dynamite cruisers and a cruising monitor), one dispatch vessel, six gunboats, one torpedo boat, seven coast or harbor defense vessels (including the five monitors), two line-of-battle ships, and one training ship. Eleven ships of the fleet, including the monitors and two of the cruisers, will be armorclad.

AN IMPROVED FISH TRAP.

The accompanying illustration represents a fish trap recently patented by Mr. Elijah W. Jenkins, of Milford, Mo. The frame has slatted side walls and a central cross piece, while in the corner post are held vertically movable slatted end walls, connected to the arms of a rod, the center of which is bent to form a lever, by pressing down upon which the end walls may be elevated to permit the entrance of the fish. Wires are hinged to the inside of the frame in such way that the



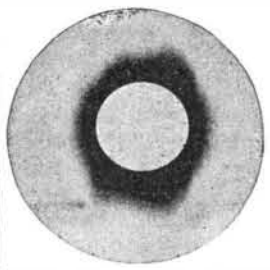
JENKINS' FISH TRAP.

fish may swim into the trap under the wires, when the wires will drop down and prevent the escape of the fish. Wire netting and converging wires are also provided on the inside of the frame to prevent the fish from swimming through the trap. To the central cross piece of a false bottom of the trap is pivoted a vertical rack bar, passing up through the upper cross piece, on which is a gear wheel secured upon a crank shaft, by turning which the false bottom and also the two end frames may be drawn up, the slatted end walls being at such time lowered to prevent the escape of the fish. For further information address Mr. G. B. Peter, agent, Milford, Mo.

THE TOTAL ECLIPSE OF THE SUN AT LICK OBSERVATORY.

Professor Holden, Director of the Lick Observatory, is preparing an elaborate report upon the result of the observations made during the total eclipse of the sun in the latter part of last January. This will be looked for with special interest. We have been fortunate enough to procure one of the photographic negatives made at that time, which we reproduce by photo-engraving process. It is printed as a positive in order that the form and extent of the sun's corona may be represented in black, thus defining more clearly the delicate penciling of the rays of the corona. In a letter published in the San Francisco *Call*, Professor Holden says:

"The first result of the photographs has been to show that the characteristic forms of the solar corona vary every eleven years, as the sun spots and the exhibitions of the aurora borealis vary in frequency. Besides this capital conclusion, the photographs enable us to conclude that the so-called polar rays of the corona can be traced all round the sun's circumference, even at the equator, and thus that we must consider these polar rays (so called) as a special typical form, quite different from the other class of rays which they resemble in appearance, but which are only to be found associated with the equatorial wings and extensions of the outer corona.



ECLIPSE OF THE SUN IN CALIFORNIA.

"So far as I know, no photograph of the corona has traced these wings further from the center than fifty minutes of arc. Out to that distance they seem to be convergent and to indicate that they quickly come to an end. Mr. Barnard's photographs, however, show faint extensions as far out as seventy-five minutes of arc, and it is evident that the outer corona, instead of quickly terminating, must extend far into space. The pictures show this divergent outer extension in a form like that of a fan, or like the open mouth of a trumpet. This, of course, indicates that the outer corona is in the shape of a huge disk, surrounding the whole sun, with its outer rim much deeper than its inner one. In fact, if the sun were surrounded by a ring of meteorites, the appearances would be much the same as in the photographs." In two photographs the outer corona is distinctly defined as far out as the 95′ circle, and may be indistinctly traced as far as 135 to 165 minutes respectively.

War Ships Launched in 1888.

According to a careful estimate, the number of war vessels launched last year by the naval powers of the world was 60, while more than 100 were building when it closed. England led, with 15 vessels launched and 28 building; France launched 9, and laid down 15; Russia launched 2, and began 10; Germany put 6 vessels into the water, and ordered or laid down 4; Italy launched 10, and laid down 18; Austria launched no vessel, but laid down or ordered 3; Sweden laid down 1; Denmark launched 1, and laid down another; China added 4 vessels to her navy, and ordered or laid down 4 more; Japan ordered 3, and launched 3; the United States launched 6, and laid down 6; Chili ordered a new cruiser in England, and the Argentine Republic contracted for a 4,300 ton ironclad; Brazil laid down a cruiser, and even Uruguay has contributed to the navies of the world, launching a small iron gunboat. The minor powers, like Greece and Portugal, have either contracted for or launched small vessels. Turkey has begun the work of building up her navy, laying down one ironclad and several smaller vessels.

Increasing Longevity.

Dr. Todd, president of the Georgia State Medical Society, read at the annual meeting of that body, held at Atlanta recently, a paper on "Longevity," which possesses great intrinsic interest and at the same time is gratifying as showing how much medical and sanitary science and a more rational mode of life have done to prolong the human span, and how much better in every way are the conditions of to-day than of those "good old times" for the return of which sentimentalists vainly sigh. The doctor is modest in his claims, making no effort to monopolize in the name of the medical profession credit for a betterment in which so many agencies play parts; but he does claim, and with reason, that the intelligent physician has had much to do with the result, and that the death rate of the various peoples of the globe bears a ratio very nearly inverse to the number of qualified physicians among them. The highest death rate in Europe is that of Russia, ranging from 20 per thousand in Courland and 22 per thousand in the Baltic province, there being many physicians in both districts, to 49 in places where there are but few. But one-half of the children born in some parts of Russia reach the seventh year, and of 1,000 male children only from 480 to 490 reach the age of 21 years, and of these only 375 are able-bodied. Russia, with all its teeming population, has only 15,414 regular physicians, and one surgeon to 100,000 population. The United States, having a doctor of medicine for every 600 population, shows the lowest death rate in the world, England following. The average life expectancy in the United States is now 55 years; in England among the urban population it is 50, and among the ruralists 54 years plus. Russians have a life expectancy of but 28 years, approximately, and Chilians of the same, while in Ellobed, in the Soudan, 23 years is a generation. The average life in the Rome of the Cæsars was 18 years; now it is 40 years. Within fifty years the average in France has increased from 28 to 45½ years, and in the days of Queen Elizabeth the English average was but 20 years. Dr. Todd ascribes the great and progressive change for the better to advanced medical knowledge, better drainage and diet, greater cleanliness, and to vaccination and the use of anæsthetics, quinine, and the like. He thinks that quinine alone has added two years to the average life of civilized man. To these agencies should be added the decrease of war, the more lenient laws, and the greater temperance of our day.—*Detroit Free Press.*

A Partnership Birds' Nest.

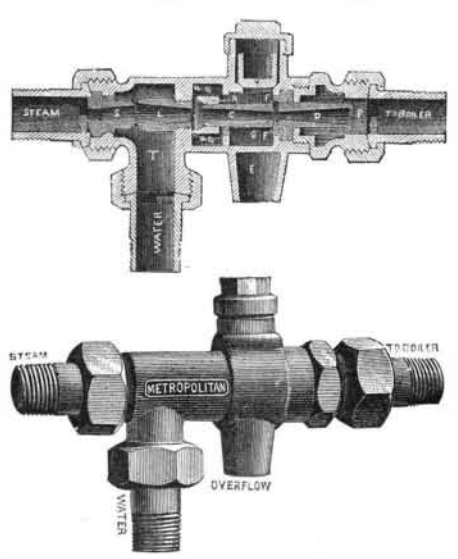
Mr. W. E. Beale writes from Folkington Manor to the *Times:* "On this estate is to be seen a nest which has evidently been built partly by a thrush and partly by a hedge sparrow. The nest itself is of the ordinary size of the thrush's nest. But instead of being lined with mud, it is lined with horsehair, wool, and moss. The birds seem to have been good friends during the laying of their eggs. Recently there were three sparrow's eggs in the nest and five thrush's. But on visiting the nest later, it was found that the sparrow's eggs had been destroyed. The birds appear to have quarreled when it came to the question of which should sit on them, and the thrush asserted its rights, not, however, without a struggle on the part of the sparrow, one of the thrush's eggs being broken, one missing, and three being perfect."

Woman's Place in Nature.

Mr. Grant Allen propounds in *The Forum* a new view of "Woman's Place in Nature." "The males," he says "are the race; the females are merely the sex told off to recruit and produce it. All that is distinctively human is man—the field, the ship, the mine, the workshop; all that is truly woman is merely reproductive—the home, the nursery, the schoolroom." "This very necessity for telling off at least a considerable number of the women for the arduous duties of human maternity prevents the possibility of woman, as such, ever being really in any deep sense the race. It is human to till, to build, to navigate, to manufacture; and these are the functions that fall upon man." "The males have built up human civilization and have made the great functionally acquired gains in human faculty, while the females have acted as mere passive transmitters of these male acquisitions."

AN IMPROVED AUTOMATIC INJECTOR.

An injector which is exceedingly simple in operation, and designed for use on any kind of boiler, is shown in the accompanying illustration. In operation it should always be placed in horizontal position, as shown, and the steam and suction pipes supplied with globe valves. Its construction and operation will be readily understood from the sectional view. When an examination of the parts is necessary, it can be readily taken apart



DESMOND'S AUTOMATIC INJECTOR.

with an ordinary monkey wrench and screw driver. This injector, it is said, can be started with 20 pounds of steam, and works up to 145 pounds without adjustment, it being adapted to work up to 200 pounds. It is claimed that a hot suction pipe will not prevent the injector from starting readily, and that severe jarring will not affect its working, its automatic qualities restarting it if the feed is temporarily stopped. This injector was invented and perfected by John Desmond, and is manufactured for Messrs. Jenkins Brothers, 71 John Street, New York City.