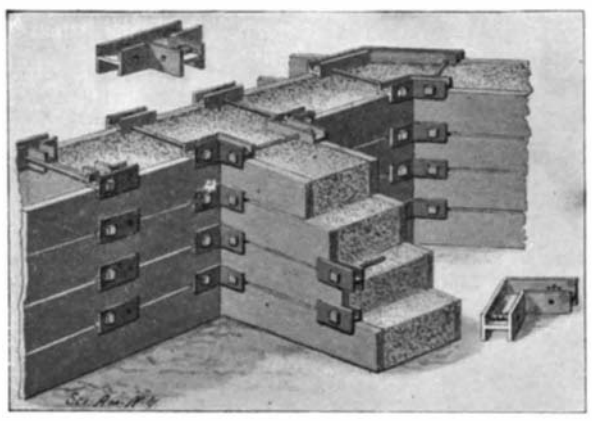
A COMBINED BOX-CAP AND SHOE-PLANK HOLDER.

In order to facilitate the construction of concrete walls, piers, columns, and the like a very efficient combined box-cap and shoe-plank holder has been devised by Mr. Thomas C. Farrell, of Washington, N. J.

As our illustration shows, the mold for the concrete wall is made of planks set on edge, the combined box cap and shoe-plank holder for these planks comprising vertical sides connected by a horizontal web, giving the construction an H cross-section. The webs have small spurs which firmly engage the planks. The combined box-cap and shoe-plank holders are connected in transverse pairs by tie-bolts.

The combined box-cap and shoe-plank holders thus constructed may be given any desired form. The T-form is useful at the end of a wall; the straight form is



BUILDER'S MOLD FOR WALL CONSTRUCTION.

employed to join together the meeting ends of two of the planks and also to strengthen the planks at points between their ends; the L-form is used when a rectangular branch of the wall is to be made; the obtuse-angled form is designed for use at the inside of a branch to or bend in the wall; and the Y-form is to be used at the outside angle of an obtuse bend.

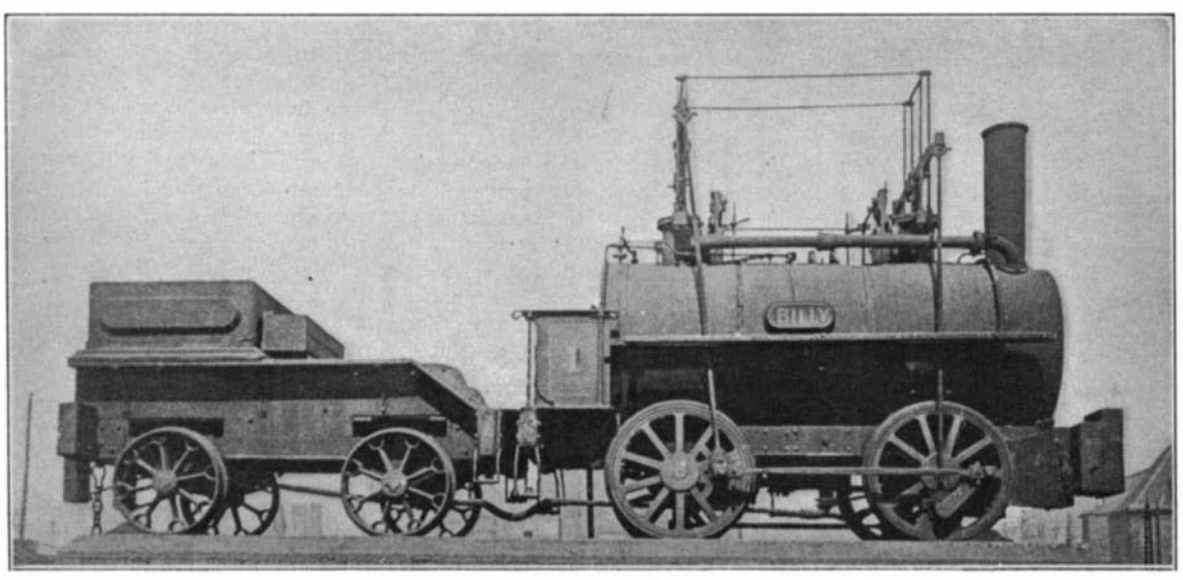
In building up a wall, four or five courses of planks are placed on top of one another—sufficient to give the foundation its proper strength. The lower planks are then taken out and used again at the top of the wall, the concrete being filled in as before. The wall may therefore be built to any desired height without the use of a continuous sheathing.

By means of the invention any intelligent practical builder can construct a fire-proof dwelling without the use of timber or stone as building material.

STEPHENSON'S LOCOMOTIVE.

The accompanying photograph represents the first locomotive built by George Stephenson, which was constructed for the Killingworth Colliery Company, in the year 1814. After doing its share of useful work as one of the notable pioneer locomotives, it came into the possession of Sir Charles Mark Palmer, who presented it to the mayor and corporation of the city of Newcastle-on-Tyne, England, on the occasion of the centenary of the birth of George Stephenson, which occurred June 9, 1881. This curious little engine is preserved as a relic of the past on a platform of the Northeastern Railway Company's Central Station at Newcastle-on-Tyne. It should be noted, however, that the "Billy," as it is called, has been somewhat modernized since the day when it first left the hands of its builder. Originally there was no smoke-box, nor were there, as explained below, any coupling rods. The boiler consisted of a cylindrical shell, with a single horizontal, cylindrical flue extending through it. The rear end of the flue constituted the firebox, and at the front end it was connected by an elbow with a vertical smokestack. The sheet-iron side to the foot-plate, on which it will be noticed the figure 1 is printed, is evidently a later addition. Two vertical steam cylinders were carried above the boiler, into which they were built, the lower half of the cylinders being contained within the boiler itself. The piston rods are connected to transverse cross-heads, from the ends of each of which a pair of connecting rods are coupled to the driving wheels.

As originally constructed, there were no coupling rods, the desired relative position of the pairs of cranks on each pair of drivers being maintained by a chain-and-sprocket gear between the two axles. On the front driving wheels was a return crank, which, with the coupling rods, served to keep the pistons in quarter position. The coupling rods were substituted in 1825. The frame of the engine is of wood, and the wooden tender is provided with a tank which is carried over the rear axle, as shown in the engraving.



FIRST LOCOMOTIVE BUILT BY GEORGE STEPHENSON.

Experiments Upon Value of Color Solution for Orthochromatic Plates.

A series of interesting researches has lately been made at the Imperial School of Graphic Arts of Vienna upon the subject of preparing orthochromatic plates from ordinary gelatine plates by sensitizing them with different solutions. Dr. Eder, whose researches in this direction are well known, has had the present series of experiments made by M. Paul Roch, an attaché of the Institute, and the latter has taken up and completed the previous experiments of Eder, Bothamley and others for comparing the sensitizing effect of a great number of color solutions for the different rays of the spectrum. The colors chosen were for the most part of the eosine group.

To find out the relative value of each of the solutions, a ray in the red was selected for comparison, and the spectrum was photographed each time with a plate sensitized with one of the solutions of the series; the effect of the sensitizer is then measured by the length of exposure necessary to produce the same deposit of silver, this effect being represented by a number inversely proportional to the length of exposure.

In this manner the following numbers were calculated. For all the colorants of the eosine group, the immersion in the color bath was preceded by a short immersion in a 2 per cent ammonia solution. The numbers thus determined confirm the previous experiments and give some new results.

Erythrosine	100
Bengal rose	50
Naphtofluoresceine	50
Methyleosine	50
Eosine	25
Cyanosine	25
Quinoline red	12
Chrysaniline	12
Fluoresceine	5

As the sensitizing power of erythrosine was found to be superior to all the others, it has been taken as a standard of comparison in the table. According to M. Roch, the method of using some of these colors is indicated in the following formulæ:

1. Erythrosine, methyleosine, ethyleosine, eosine:
a. Preliminary ammonia bath, 2 per cent solution.
b. Sensitizing bath.

Color solution at 2 per cent	6 parts
Ammonia	2 parts
Water	100 parts

2. Bengal rose:
a. Preliminary ammonia bath, 2 per cent.
b. Sensitizing bath.

Color solution at 2 per cent	2 parts
Ammonia	2 parts
Water	100 parts

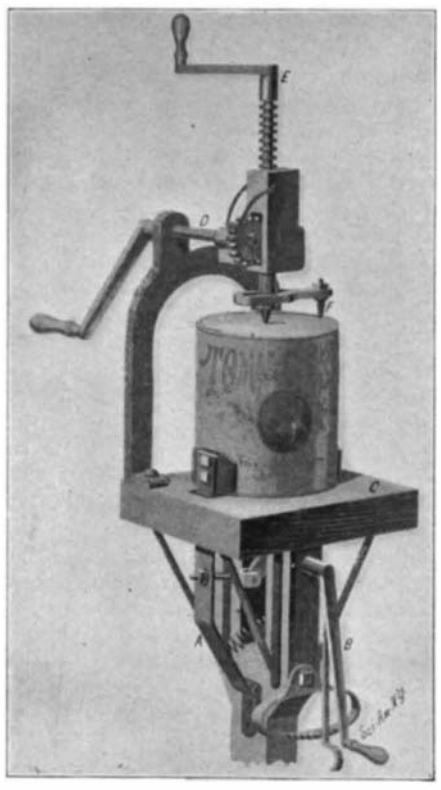
For naphtofluoresceine and cyanosine, 12 parts of a 1 per cent color solution are taken, the rest of the formula remaining the same. With quinoline red, no preliminary bath is used, and the sensitizing bath is made up with 1 to 2 parts of a 2 per cent color solution to 100 parts of water. It should be remarked that the plates rendered orthochromatic by the use of the color solutions cannot be kept for a great length of time before using; the best results are obtained immediately after drying. If, as is usually the case with amateurs, orthochromatic plates are not used continually, the fact of being able to sensitize one's own plates presents some advantages.

A train on the Burlington route recently had all the windows on one side broken by hail.

A NOVEL CAN-OPENER.

An ingenious machine for opening preserve-cans is the subject of a patent which has recently been granted to Truman A. Darling, of Anaheim, Cal.

As our illustration shows, the machine comprises a standard carrying a platform, *C*, and having two jaws, *A*, pivotally mounted on opposite sides of the standard and pressed apart by a coiled spring. An opening is made in the standard for the passage of



A MACHINE FOR OPENING CANS.

the spring. The jaws, *A*, pass upwardly through the platform, *C*, to grip the opposite sides of a can. In order to draw the jaws toward each other so that the can may be firmly clamped, links are employed, connected by a lever which is controlled by a crank, *B*. The crank is provided with a spring-pawl which works with a ratchet-bar fastened to the standard. By means of the spring-pawl and the ratchet, the crank, *B*, may be held in any desired position. By moving the crank the lever may be thrown to draw the jaws, *A*, together so as to engage the can; by throwing the crank, *B*, in the opposite direction the jaws are released and the coiled spring allowed to throw the jaws in open position.

The platform, *C*, carries an arch-shaped frame on which a crankshaft, *D*, is fitted. The crankshaft is provided with a pinion which meshes with the annular teeth of a vertical crankshaft, *E*, enclosed partially in a sleeve. A pawl is mounted on the sleeve to engage the pinion on the crankshaft, *D*, to hold it in any desired position. The lower end of the crankshaft, *E*, is formed with a point which is intended to pierce the center of the can-head. A transversely-disposed arm is adjustably held on the lower end of the crankshaft, *E*. The outer end of this arm carries a knife, *F*, which is intended to cut out the head of the can as the shaft, *E*, is rotated.

In using the machine the can is placed upon the platform, *E*, and the jaws, *A*, are engaged with its opposite sides by manipulating the crank, *B*. By rotating the crankshaft, *D*, the crankshaft, *E*, is moved down so that its lower point engages the head of the can. The same movement will bring the knife, *F*, into contact with the can. By throwing the pawl on the sleeve down, the pinion is held immovable; and by turning the crankshaft, *C*, once, the knife, *F*, will cut out the head of the can.

An experiment is being made in New York city in connection with the water supply for the condensing plant of the Edison Company at their new electrical power house in course of erection at Thirty-ninth Street and East River. A steel tunnel, 250 feet long, measuring 12½ feet in diameter, and weighing over 1,000 tons, has been built, and the intention is to sink the tunnel some 23 feet under water and to use it as a huge aqueduct to lead water from the river to the condensing plant referred to above.