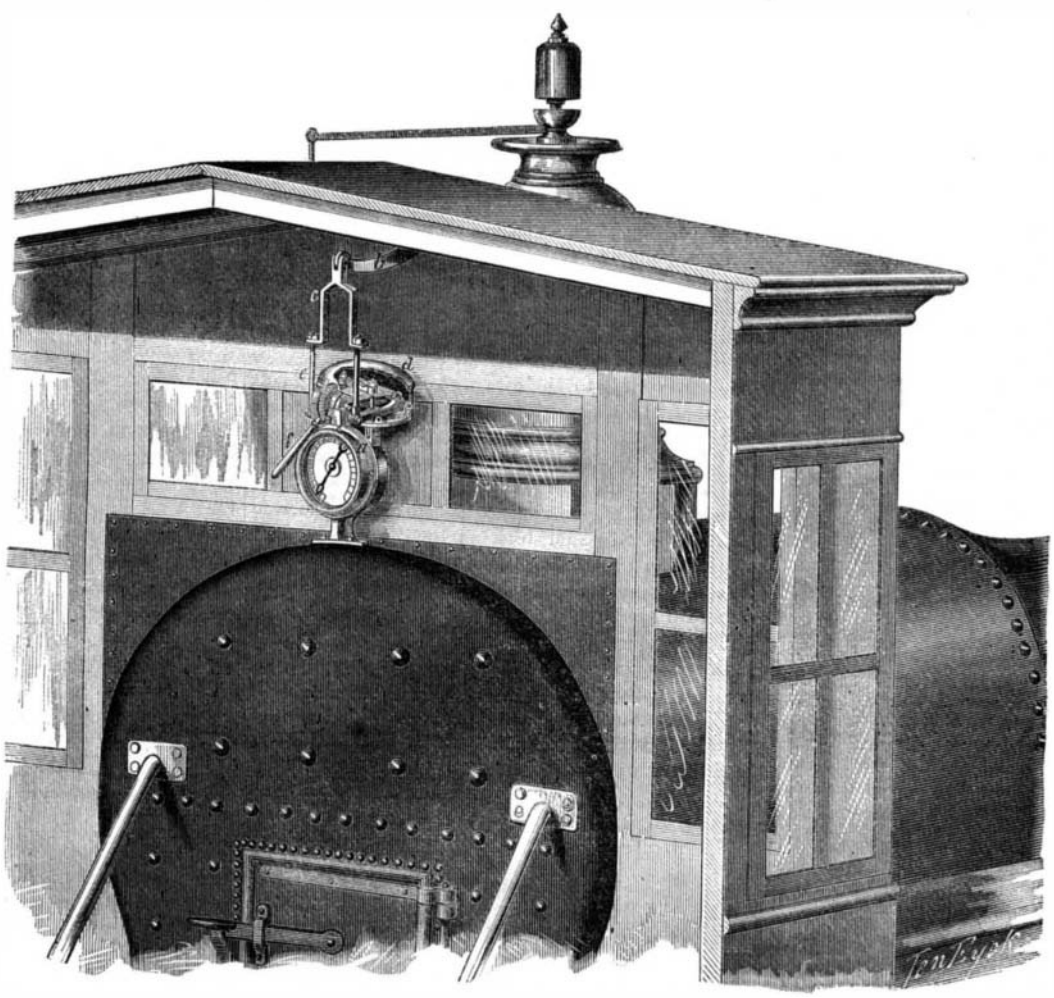
Improved Spring Balance for Safety Valves.

When a locomotive engine is running the safety valve is loaded sufficiently to keep up the working pressure in the boiler, but when the engine is stopped for a short time without the fire being drawn, a proper regard for safety requires that the load on the safety valve should be immediately reduced, and all careful railroad managers require this to be done. Heretofore the load upon the valve has been varied by turning a nut upon a rod, and it is necessary to turn the nut so far that engineers have frequently neglected to perform their duty in this respect with fidelity, thus exposing their engines to the danger of explosion.

On page 128 of Vol. IV. (new series) of the SCIENTIFIC AMERICAN, we illustrated a device by which the load could be instantly reduced to any extent or taken off entirely, by a single motion of the hand. The inventor has since arranged this device in connection with a steam indicator, and the annexed engraving shows the manner in which the two are applied practically to a locomotive engine.



GRAHAM'S SPRING BALANCE FOR SAFETY VALVES.

The steam indicator, *a*, is furnished with a pedestal by which it is bolted to the top of the boiler, and it is surmounted by the spring balance, *d*, which is connected with the lever, *b*, of the safety valve by the link, *c*.

The cap of the spring balance is represented as broken away to show the the internal structure.—The vertical rods, *e*, connect the lever of the safety valve with two side levers which are pressed downward by a flat elliptic spring, and the pressure of this spring is varied by the turning of an eccentric, which may be turned by means of the lever, *f*. The fulcra of the levers are so arranged that a slight turn of the handle, *f*, makes a large variation in the pressure of the spring, and thus but little motion of the hand is required to reduce the load upon the valve, or to throw it off entirely.

The arrangement of the parts will be more readily understood by an inspection of the cut on page 128, Vol. IV., as that is on a much larger scale.

The patent for this invention was granted, through the Scientific American Patent Agency, Dec. 18, 1860, and further information in relation to it may be obtained by addressing the inventor, Charles Graham, at Scranton, Pa.

Cast Iron Punches and Dies.

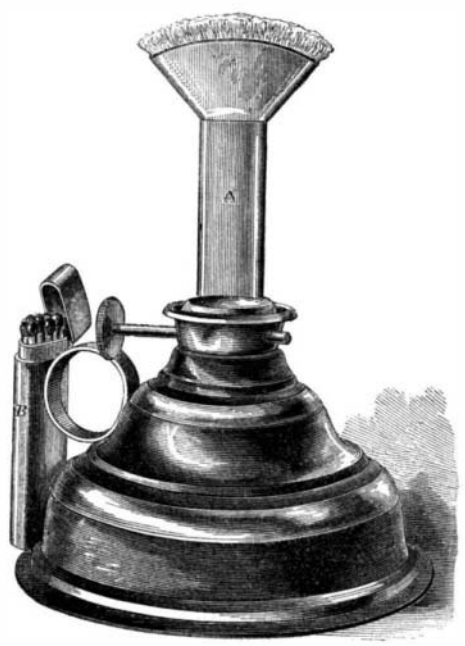
At a meeting of the Institution of Mechanical Engineers, England, E. A. Cooper stated that he had found cast iron stand best in a large hydraulic punching press, for punching out red-hot links for suspension bridges. A link 7½ feet long and 1 foot 8 inches across the eye, was punched out of 1 inch thickness of metal, by a cast-iron punch and die. He had tried steel punches, but they did not stand in punching more than half a dozen of such links. The frequent heating of the steel in contact with the hot iron in punching, soon rendered it useless. Cast iron punches and dies usually lasted about a month, in which time they punched out about 200 such large links.

A "Quarter" of Grain.

In the English markets, grain is quoted by the "quarter," and the price in shillings sterling. The quarter contains eight imperial bushels, or eight and a half bushels, 33 American or Winchester bushels equal 32 imperial bushels). The English shilling equals about twenty-four cents and two mills. For rough calculation we may reckon the sterling shilling at a quarter of a dollar, and to reduce London rates to New York bushel prices, divide the quoted shillings per quarter by 33. The telegraph reports a certain grade of wheat in London at 57s. or $14 25 per 8¼ bushels. Or, dividing 57 by 33 gives about $1 73 per bushel. From this we deduct freights, waste, insurance, commission, &c., to get the corresponding price in New York. When flour is quoted by the barrel, we have only to divide by four to get the price in dollars, nearly. (Just now four shilling, sterling are considerably more than $1, owing to the price of gold, and the cost of exchange.)

VIDAL'S ROCK-OIL LAMP.

We here illustrate another novel idea for obtaining



a lamp without a chimney that will burn rock oil without smoking. The plan consists in spreading the wick at the upper end in order that the flame may be brought in contact with a large surface of air, and thus may receive sufficient oxygen to insure perfect combustion.

The wick tube, A, is elongated and enlarged at the upper end, as clearly shown in the engraving; the sides being drawn a little towards each other at the middle of the opening so as to crowd the wick toward the edges and cause it to spread. The wick is split, and is forced upward by a pinion in the usual manner.

The handle is formed by attaching to the outer side of the ring as a brace, a match case, B, and the bottom of the lamp is roughened, by a coat of emery or in any other suitable manner, to furnish a surface for lighting the match.

The inventor says that this lamp has been tried successfully for lighting cars, and that it is very well adapted for the head lights of locomotives as well as for use in lanterns. It is also designed for use as a hand lamp for general household purposes.

The patent for this invention was granted, through the Scientific American Patent Agency, July 23, 1861, and further information in relation to it may be obtained by addressing the inventor, U. B. Vidal, corner of Broad and Noble streets, Philadelphia.

Papier Mache.

Papier mache is not always strictly mashed paper—however it may be occasionally—neither can it be uniformly designated as a composition, especially in the production of finer ornamental articles.—When consisting of the pulp of paper, boiled with glue or gum arabic, &c., the cheaper articles are made from it; but the better ornamental work is made by causing sheets of paper to adhere or to be consolidated together to any required thickness. The pulp is rendered nearly water-proof by uniting with glue a preparation of sulpate of iron; and almost total incombustibility is secured by combining with the water-proof pulp, phosphate of soda and borax. All present diversities of papier mache manufactures may be comprehended and classed under five divisions: 1st, fibrous slab made only with coarse fiber mixed with earthy matter, then, after the addition of a cementing size, the whole is well kneaded together with the aid of steam, and with the proper ingredients, the substance is made fire-proof; 2d, sheets of paper pasted together upon models; 3d, thick sheets or boards produced by pressing paper pulp between dies; 4th, carton-pierre, prepared from paper pulp or paper mixed with whiting and glue, pressed into plaster piece molds, backed with paper, and when sufficiently set, hardened by drying in a hot room; 5th, Martin's ceramic papier mache, consisting of paper pulp, glue, rosin, sugar of lead and drying oil, mixed in certain fixed proportions and kneaded together. It can be kept in a plastic condition for half a year by keeping the air away and kneading the mass occasionally.

SCIENCE OF IRON PLATES AND PROJECTIES.—We would direct attention to the able paper of Mr. William Fairbairn, C. E., F. R. S., on another page. It has been published in the *Engineer*, *Mechanics' Magazine* and *Artisan*, London, and contains a fund of practical and genuine scientific information.