

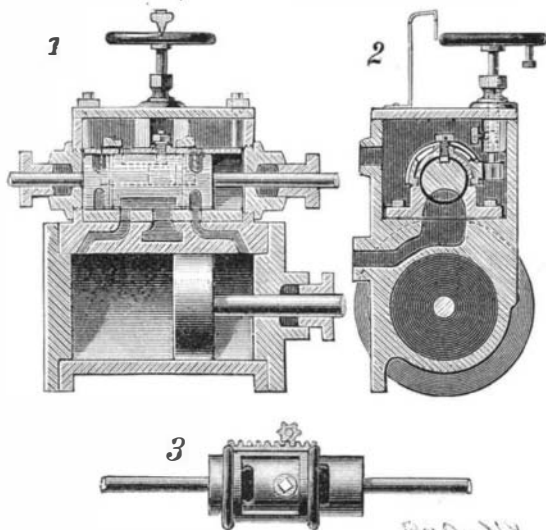
EVOLUTION OF THE SAFETY LAMP AS SHOWN AT THE FAIR.

The display of the Colliery Engineer Co., of Scranton, Pa., consists of an evolutionary exhibit of safety lamps for use in gaseous mines. All types of lamps, from the primitive inventions of Sir Humphry Davy and Dr. Clanny down to the most approved types of modern lamps, are shown. This exhibit was prepared at the request of the Mining Department of the Exposition and is not intended as a competitive one. It is the most complete collection of safety lamps ever exhibited. The Colliery Engineer Co., through its journal the *Colliery Engineer*, and its correspondence schools of mines and mechanics, has naturally paid great attention to the subject of the safe and economical working of mines, and naturally was well qualified to arrange this important exhibit. Through the reputation of the *Colliery Engineer*, and a thorough knowledge of the subject on the part of its officers, the lamps of all the leading manufacturers of the world were secured, and they are exhibited side by side. No attempt is made to show the superiority of any one make over the others but a handsome pamphlet containing information regarding the principles of the leading types, together with information as to the best types for either testing gases or for working at the face of the mine, is distributed. The matter contained in this pamphlet is taken from the instruction paper on safety lamps used in the Correspondence School of Mines, which is also owned by this company.

The Correspondence School of Mines is an institution that teaches all branches of science connected with mining by correspondence, and during the past two years has enrolled over 2,000 students. Students are not required to leave their homes or neglect their business. Everything is taught by correspondence and each student receives special attention, as he is a class by himself. The Correspondence School of Mechanics, under the proprietorship of the same company, is a similar institution for the education of students in the various principles of mechanics and mechanical drawing. The facilities offered working men, who cannot afford to leave their homes or neglect their work and who desire such education in either mining or mechanics as will enable them to advance in their business, are most excellent, and the terms of tuition, including the lesson and question papers, are very low. Payments for instruction can be made monthly, and this places the advantages of the schools within the reach of any working man. The schools are both indorsed by all prominent mining and mechanical engineers who have examined into the system, and numerous students have been recommended to the schools by prominent educators in all parts of the country.

A BALANCED STEAM ENGINE VALVE.

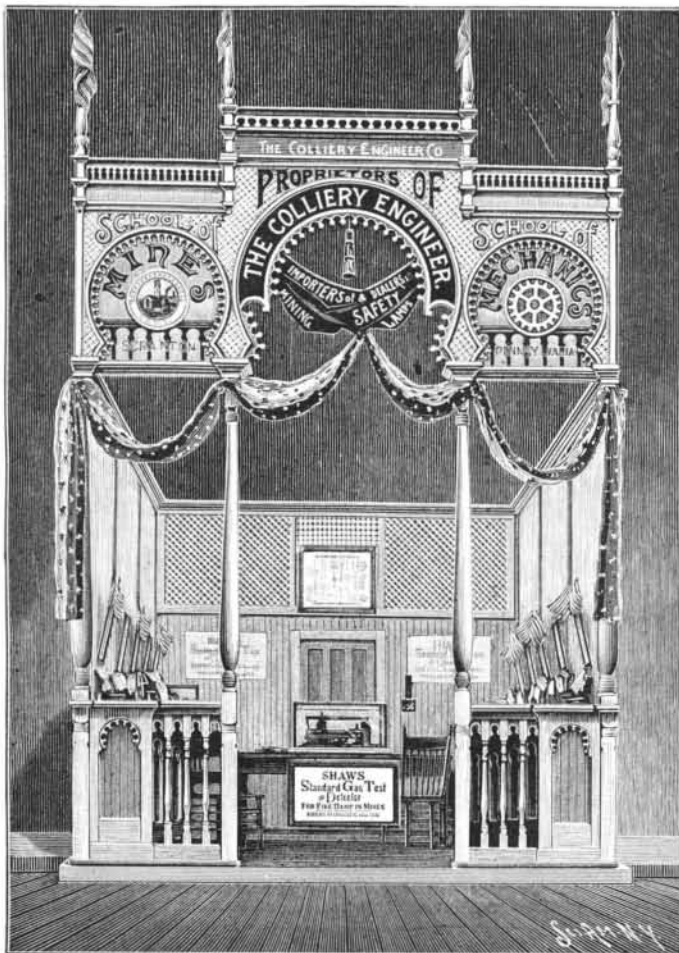
The valve shown in the illustration, recently patented by Mr. Augustin Roche, of Butte City, Montana, is completely balanced, both as to the inlet and the exhaust. Figs. 1 and 2 are side and transverse sectional views of the improvement as applied, and Fig. 3 is a plan view. Fastened in the bottom of the steam chest, on the cylinder, is a casing having in its bottom ports registering with those of the cylinder and with the ports in-



ROCHE'S STEAM ENGINE VALVE.

a cylindrical valve sliding in the casing, the latter inlet ports registering with two ports in the top of the casing which open into the interior of the steam chest. The stuffing boxes in which the valve stems slide are screwed into position, and when removed the valve may be passed through the apertures in the ends of the steam chest. To prevent the turning of the valve, a screw in the top of the casing projects into a longi-

tudinal recess in the top of the valve. The cut-off mechanism consists of a saddle with flanges sliding in guideways on the valve casing, there being on one side of the saddle a rack engaged by a pinion on the lower end of a shaft turning in a stuffing box on the cover of the steam chest. The shaft is actuated by a hand wheel to move the saddle so that it will cover to a greater or less extent the ports in the top of the casing opening into the steam chest. The top of the hand wheel has a graduation on which is a fixed pointer, to indicate at all times the position of the saddle, and the wheel may be actuated from a suitable governor instead of being turned by hand. From the valve being



THE WORLD'S COLUMBIAN EXPOSITION—THE COLLIERY ENGINEER'S EXHIBIT OF SAFETY LAMPS.

inclosed in a separate casing, it is completely counter-balanced, both as to the live steam and the exhaust, and the casing serves to relieve the valve of the pressure of the steam entering the steam chest. The several parts of the valve are readily removable from the steam chest for repairing or other purposes.

SUCROL.

Sucrol is the name given to parafenetal carbamide, a harmless substance of deliciously sweet taste, produced by adding a solution of potassium cyanate to muriate of amidophenetol. It is easily crystallizable in small white tables having a melting point of 160° C. (320° F.). It is soluble in alcohol and ether and in hot muriatic acid, also in hot acetic acid, as well as in all the solvents usually employed. Diluted alkalis or acids do not act on it. Its solubilities appear from the table given below:

- 1 gramme dissolves in 50 grammes of hot water.
- 1 gramme dissolves in 800 grammes of cold water.
- 1 gramme dissolves in 25 grammes of alcohol 90 per cent.
- 1 gramme dissolves in 80 grammes of alcohol 45 per cent.
- 1 gramme dissolves in 480 grammes of glycerine.

Dr. Henry Paschke has made exhaustive experiments to determine its value and applicability. He finds that sucrol has no influence on the circulation, respiration, or digestion, nor on the nervous system in general. It is particularly adapted for use by diabetics, dyspeptics, and those suffering from obesity. Its sweetening power is 200 times that of sugar. There is a slight difficulty in the use of the powdered preparation, as it is not easy to moisten it; but this is absolutely absent if it is used in the shape of fine crystals. To sweeten tea, coffee, etc., it is best to pour them hot on the sucrol in the cup.

The First American Railway.

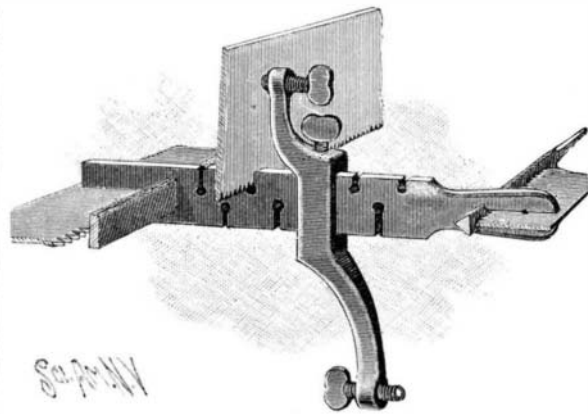
Mr. Lewis Cheney, of Chelsea, Mass., now 85 years old, enjoys the distinction of being the only man now living who worked upon the famous "Granite Railway," built in 1826 in Quincy, Mass., chiefly to transport stones for building Bunker Hill monument. He chances also to have been the man who drove the horses which hauled the cars which carried the first load of stones over the road. The record given by the "Columbian Sentinel" of this historical event, whose importance was then little dreamed of, was as

follows: "This railroad, the first we believe in the country, was opened on Saturday (Oct., 1826), in the presence of a number of gentlemen who take an interest in the experiment. A quantity of stone, weighing 16 tons, taken from the ledge belonging to the Bunker Hill Association, and loaded in three wagons, which together weighed five tons, was moved with ease by a single horse from the quarries to the landing above Neponset Bridge, a distance of more than three miles. The road declines gradually the whole way, from the quarry to the landing, but so slightly that the horse conveys back the empty wagons, making a load of five tons. After the starting of the load, which required some exertion, the horse moved with ease in a fast walk. It may, therefore, be easily conceived how greatly the transportation of heavy loads is facilitated by means of this road. A large quantity of beautiful stone already prepared for the Bunker Hill monument will now be rapidly and cheaply transported to the wharf at the termination of the railroad, whence it will be conveyed by lighters to Charlestown. The road is constructed in the most substantial manner. It rests on a foundation of stone, laid so deep in the ground as to be beyond the reach of frost, and to secure the rails on which the carriage runs effectually against any change in their relative position, they are laid on stones of 8 ft. in length, placed transversely along the whole extent of the road at a distance of 6 to 8 ft. from each other. The space between these stones is filled in with smaller stones or earth, and over the whole between the rails a gravel path is made. The rails are formed of pine timber, on the top of which is placed a bar of iron. The carriages run upon the iron bars and are kept in position by a projection on the inner edge of the truss wheels. The wheels are of a size considerably larger than a common cart wheel.

"We learn from a gentleman who has visited the principal railroads in England, that in point of solidity and skill of construction this is not exceeded by any one there."

A CONVENIENT SAW SETTING DEVICE.

With the device shown in the picture saw teeth of all ordinary sizes may be accurately set to any desired degree, and the sharp points of the teeth be protected by a clearance in the setting tool, by means of which also the truing up of the teeth to even lengths and at right angles with the blade may be readily effected. The improvement has been patented by Mr. Carl M. Kardell, of Marshfield, Oregon. The main blade of the tool is of tempered steel, and has in both edges notches of various sizes and depths for the different sizes of saw teeth to pass into when the saw is being set the bottom portions of the notches being enlarged to form a clearance for the sharp points of the teeth. A reversible and adjustable cross bar is set tightly upon the main blade by a thumb screw, and at each end of the bar is a thumb screw, either one of which bears against the side of the saw blade in setting, the amount of the setting being regulated by the adjustment of the bar and one of the thumb screws at its ends. The main blade also has at one end a slot terminating in a space into which a flat file may be stuck, for filing evenly the points of the teeth of a large saw, while the other or handle end of the blade has a smaller slot, for truing the teeth of small saws, a space being provided at the bottom of the slot for the insertion of a three-



KARDELL'S SAW SETTING DEVICE.

cornered file. Both of these slots are slightly widened near the file-receiving spaces to give room for the set of the teeth.

BREECH-LOADING rifles were invented in 1811, but did not come into general use for many years. It is estimated that over 12,000,000 are now in actual service in the European armies, while 3,000,000 are reserved in the arsenals for emergencies.