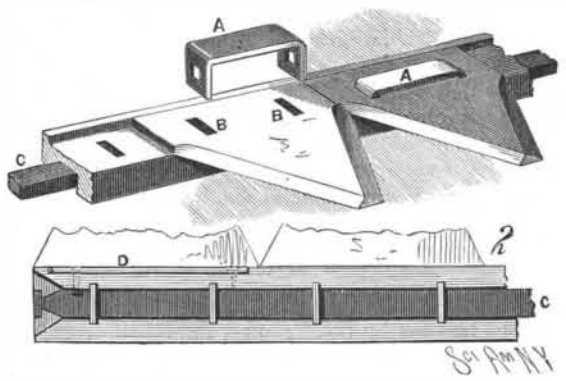
### IMPROVED CUTTER BAR FOR MOWERS AND REAPERS.

A device for fastening the cutters on the cutter bars of mowers and reapers, so that the cutters may be quickly removed for grinding and other purposes, is shown in the accompanying illustration, and has been patented by Mr. Wallace B. Comstock, of Allendale Center, Mich. The under side of the cutter bar has a longitudinal groove, into which fits a key, C, and the bar also has vertical slots, corresponding with similar slots, B B, in each cutter, through which pass the side arms of a U-shaped staple, A. The outer end of the key, C, has a notch, into which fits a pin passing through an aperture in the bar, and secured to the free end of a spring, D, fastened to the front edge of the

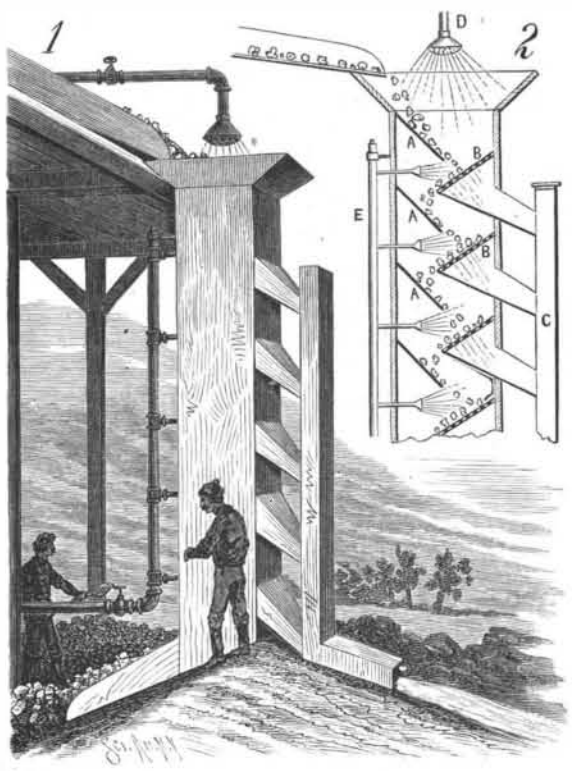



COMSTOCK'S CUTTER BAR.

bar, as shown in Fig. 2, whereby the key is locked in place. The eye, which connects in the usual manner with the devices for imparting motion to the bar, is also fastened to the bar by the key, C, and all the cutters can be readily removed when the key is withdrawn.

### AN IMPROVED ROCK WASHING APPARATUS.

A method of cleansing rock from such impurities as sand or mud, previous to pulverizing, is shown in the accompanying illustration, and has been patented by Mr. Oscar W. Donner, of Coosaw, S. C. The rock is delivered through a hopper to a vertical conductor, which has a series of inclined plates or aprons, A,




DONNER'S APPARATUS FOR WASHING ROCK.

and opposite perforated plates, B, the rock falling first upon one and then another of these plates in its passage downward through the conductor. Over the conductor is a rose nozzle, D, which showers water upon the rock, and opposite each of the perforated plates are jets supplied from a stand pipe, E, the water thus sprinkled on the broken rock passing down the conveyer carrying off the refuse matter through the chute, C. The number of the plates, and their inclination and arrangement, may be varied according to the nature of the material to be treated.

### Photographs of Lightning Flashes.

Some very perfect photographs of the flashes of "forked lightning" have recently been secured by Mr. W. N. Jennings. Considerable difficulty is naturally experienced in securing exposures of so pre-eminently uncertain a subject. In two instances recently Mr. Jennings has achieved quite a notable success. One of the interesting features of the exposures is the undulatory or wave-like character of the tracing. The zigzag appearance so often shown in pictures is not present. The general appearance is that of the branch of a tree outlined by the flash. The lines are slightly sinuous, but nowhereof the conventional shape of "artistic lightning."

### AN IMPROVED OX BOW.

The invention herewith illustrated provides an ox bow which will not bear upon the windpipe or upon the veins or arteries of the neck, and has been patented by Mr. Luman Rundell, of Grapeville, N. Y. The bow as represented is formed partly of wood and partly of metal, the metal portion being made tubular and forming an enlarged lower part of the bow, which is of sufficient size to relieve the lower part of the throat of the ox from any pressure of the bow. It may, however, be made entirely of wood bent into the form shown, or even of a piece of gas pipe bent into suitable form.

### RIPENING OF LIQUORS BY OZONE.

The researches that have been made up to the present with a view of arriving at a process of removing the bad taste of alcoholic liquors and of artificially ageing them, prove how much interest a solution of the problem presents. We have already described the process of Mr. Naudin, which consists in converting into alcohol, through electrolytic hydrogen, the aldehydes that give distillers' wash its bad taste. Other processes consist in oxidizing the alcohol directly by passing through it a current of oxygen or ozonized air. It is on this principle that is based the process that we are about to describe and that is being worked by Messrs. Teillard and Tournous, purchasers of the Broyer and Petit patents.

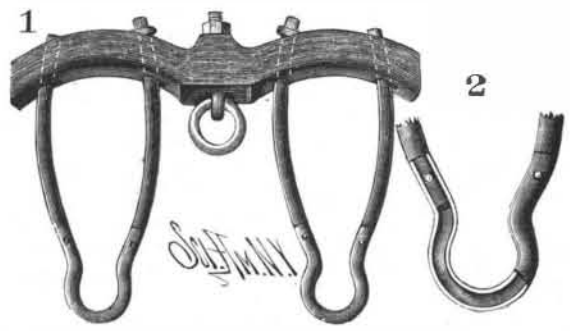
The process consists in the use of very pure and concentrated ozone under pressure, and making it serve several times in succession by regenerating it after each operation.

Ozone, the existence of which was recognized as long ago as 1785, was not really discovered till 1840, and although it has since been studied by eminent chemists, its use in the industries has not hitherto extended much. It is produced by causing an electric current to pass into oxygen, which, as a consequence of this operation, becomes reduced from three volumes to two. It is therefore a strengthened oxygen—an oxide of oxygen—and so has very strong oxidizing properties. All those who have handled plate electric machines or Ruhmkorff coils know its characteristic odor, whence, in fact, is derived it name (ὄζω, 'I smell').

To make ozone, it suffices, then, to bring oxygen into contact with an electric current; but there are certain conditions to be fulfilled in order to obtain the best possible yield. One of the best known apparatus is Mr. Houzeau's, an example of which is shown at the bottom of Fig. 1. It consists of two spirals of aluminum wire isolated from each other by a glass tube, one being wound around the tube and the other being within it. The whole is inclosed in a larger glass tube, into which is passed the current of oxygen that is to be converted into ozone. Each spiral is connected by one of its extremities with a terminal affixed to the outer tube, and which serves to connect it with the source of electricity.

The ozone produced with this simple apparatus would not permit of deodorizing alcohol economically, and so Messrs. Broyer and Petit, in concert with the skillful glass blower Seguy, have arranged it in such a way as to obtain oxygen ozoned to the highest degree possible and to much increase the effect produced. The arrangement adopted is shown at the upper part of Fig. 1. It consists in the use of three tubes like the one just described placed alongside of each other and connected by elbows, and in electrifying each tube separately by means of an induction coil actuated by a pile of two elements. In this way, the oxygen already converted into ozone in the first tube passes into the second and then into the third, and is each time submitted to a new electrification. The induction coils and piles used up to the present are to be replaced by an alternating current dynamo. Each tube will be connected with the general circuit by a special derivation, in such a way that the conditions will be the same as they are at present.

This mode of producing ozone gives remarkable results, and the influence of the three successive electri-




RUNDELL'S OX BOW.

fications may be easily seen by means of the reagent usually employed (terebinthine and tincture of guaiac), which ozone turns blue. If we take the gas coming from the first tube, we obtain a certain coloration that will serve as a starting point. Making the same test with the gas as it comes from the second tube, we find that the color is tenfold deeper; and, finally, on making its exit from the last tube, the color is fifteen times deeper than at first. If the tests be extended still further, we observe hardly any increase in the depth of the color, and it is hence concluded that three tubes are sufficient to allow the gas to give its maximum effect.

The essential oils that give alcohol its bad taste do not resist the action of ozone thus prepared; but in order to obtain a good result it is necessary to pass into the alcoholic liquid at least ten times its bulk of ozone. This represents considerable of an expense, especially when we consider that the oxygen to be converted into ozone must be very pure. In order to obviate this inconvenience and render the method really practical, recourse is had to an ingenious process that consists in the use of the same oxygen several times in succession. In fact, the oxygen is not destroyed by its conversion into ozone, but undergoes a simple transformation—a concentration that gives it new qualities. But it resumes its first form, either after being heated to about 75° or after being utilized in chemical reactions like those under consideration.

Fig. 2, which gives a general view of the Teillard plant, shows how this property has been put to profit. The oxygen is produced in cast iron retorts (not figured) by means of a mixture of chlorate of potash and binoxide of manganese, and is purified by passing it

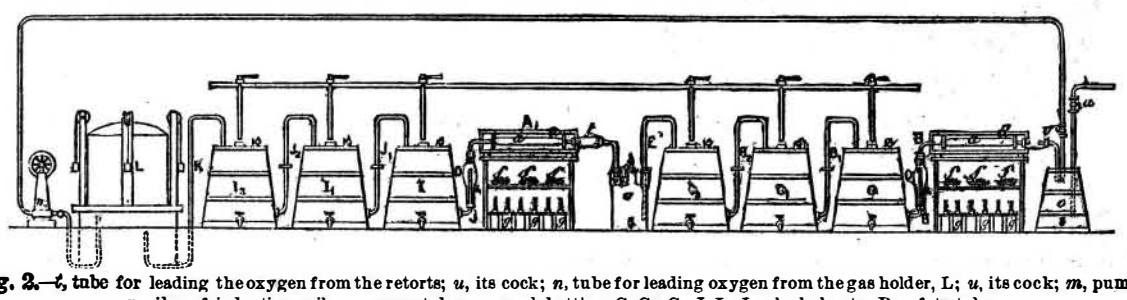


Fig. 2.—*t*, tube for leading the oxygen from the retorts; *u*, its cock; *n*, tube for leading oxygen from the gas holder, L; *u*, its cock; *m*, pump; *g*, piles; *f*, induction coils; *a*, ozone tubes; *o*, wash bottles; C, $C_1$, $C_2$, I, $I_1$, $I_2$, alcohol vats; D, safety tube.

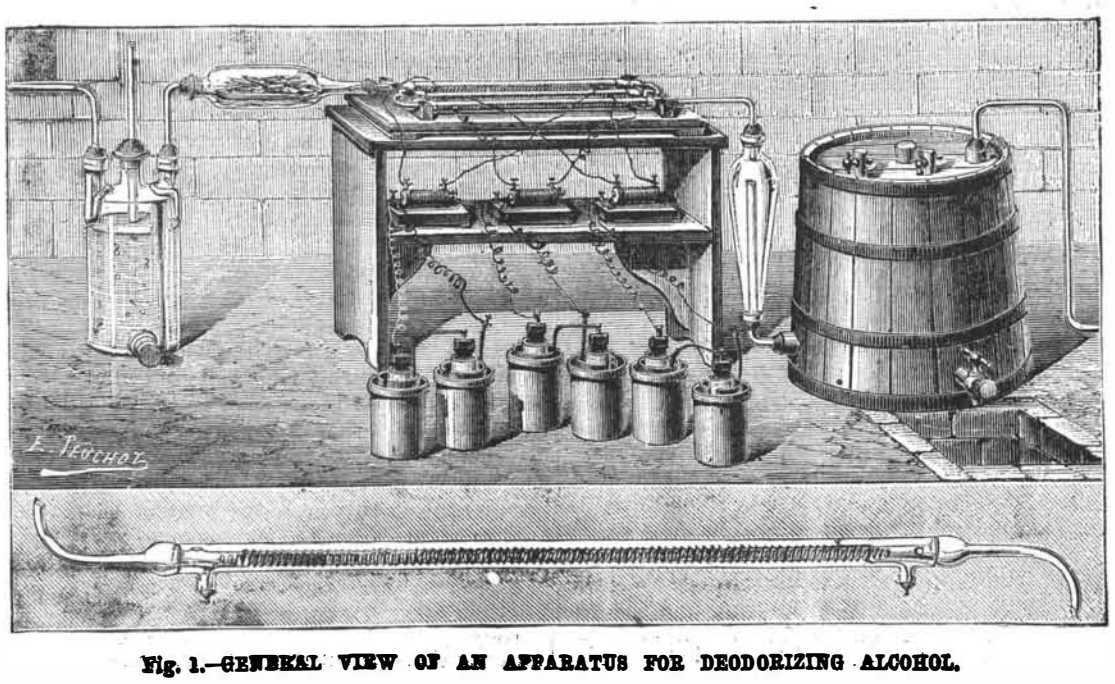


Fig. 1.—GENERAL VIEW OF AN APPARATUS FOR DEODORIZING ALCOHOL.