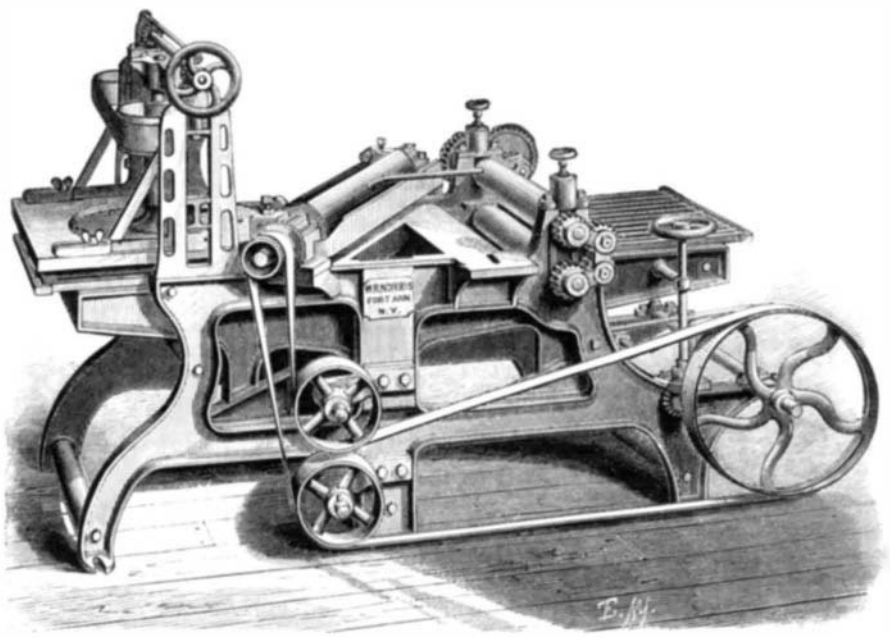
IMPROVED DIAGONAL PLANING AND POLISHING MACHINE.

The accompanying engraving represents one form of Norris' diagonal planing and polishing machine, which is a Woodworth planing machine of the raising and lowering bed class, and of improved construction. The cutting cylinder is made to be changed, at will, from its usual position of square across the machine, to a diagonal one of 35°, and *vice versa*. A polishing device is also provided which, when suitably adjusted, polishes the surface of the material after the latter has passed the planing cylinder. Among the advantages claimed is that, when smoother surfaces than can ordinarily be produced by planing machines are required, the cylinder can be instantly swung into the diagonal position, and the polishing device thrown into gear; rough lumber fed in then emerges with the surface planed and polished, ready for paint, oil, or varnish. With the cylinder working diagonally, all kinds of framed articles, such as doors, sashes, blinds, ends of bureaus, commodes, desks, cabinet organs, etc., are claimed to be planed, as easily, perfectly, and cheaply as common lumber, and with the polishing device in operation they are polished perfectly at the same time. The manufacturer states that two men are enabled to do the work of twenty skilled men with hand tools, and at the same time make better surfaces. The machine is adapted for the uses of carpenters' and joiners' shops, sash, blind, and door factories, cabinet-makers' shops, cabinet organ, furniture, railroad, and street car factories, whether large or small, using the cylinder square across for ordinary surfacing, and diagonally for *smooth* planing and where flat frame work is to be smoothed.



NORRIS' PLANING AND POLISHING MACHINE.

Nearly fifty of Mr. Norris' machines are, we are informed, in use in the sash, blind, and door factories of the United States and Canada. The machine from which the annexed engraving was prepared is in use in the largest walnut furniture factory in this city.

Further information may be obtained by addressing W. R. Norris, Fort Ann, N. Y. Arrangements for the manufacture of these machines in Canada are desired.

IMPROVED CALF MUZZLE.

Mr. August Miller, of Salina, Kansas, has patented, January 18, 1876, a muzzle for calves, by which they can be effectively prevented from sucking the cows when in the same inclosure with them, without being hindered from grazing or getting other food. The muzzle may also be used for dogs and other animals with advantage.

In the engraving, A represents a rigid frame, made of a solid or full-top part, of zinc or other material, that is fitted on the nose of the calf or other animal to protect the same against getting chafed or sore. The top plate is fastened thereto by a flexible head strap, *a*, and a lower jaw strap, *b*. A swinging guard plate, B, is hinged to the front edge of the full-top frame, A, and it extends fully across the front of the mouth. The guard plate has at both sides hinged plates or boards, C, with projecting spur-shaped rear and top extensions, *d*, that serve to hurt the cow when the calf attempts to suck, so that it is driven off and prevented from taking hold of the teat. The front and side guard plates close over the mouth on the upward motion of the calf's

head, but do not interfere with the grazing or other feeding when the head is in downward position, as the plates swing away from the nose and admit the free use of the mouth. The side plates, C, are provided at the top spur, *d*, with inwardly projecting catches, *e*, that engage the side flanges, *f*, of the top frame when the calf turns one side up to get the teat into the corner of the mouth. The side plate is thereby locked to the frame and shuts out the teat, securing at the same time the position of the front guard plate, so that the same cannot be swung higher by the jerks of the animal's head when trying to get the teat.

A Simple Test for Carbonic Oxide.

All previous methods for estimating or detecting carbonic oxide by oxidizing it with chromic acid, absorbing it in subchloride of copper, or reducing palladium solutions, are tedious and difficult. Professor H. W. Vogel has turned his favorite weapon, the spectroscope, against this, and again brought down his game. The reagent which he employs to absorb the carbonic oxide is simply blood and water. This mixture is so dilute as to have only a faint red tinge, and, when placed in an absorption cell, 1·8 to $2\frac{8}{10}$ inches thick, shows distinctly the well known absorption bands. In testing the air of a room for carbonic oxide, he takes a bottle that will hold 100 cubic centimeters, fills it with water, and then empties it in the room where the test is to be made. Of course, as the water flows out, the suspected air rushes in to fill the bottle. About 2 cubic centimeters ($\frac{1}{8}$ cubic inch) of the diluted blood is poured in, and the bottle shaken for one minute only. The color of the blood changes, it looks more pink, the absorption bands are a little paler and pressed a little back to the left or end of the spectrum. A skilled spectroscopist would notice this at once; but for the less experienced, Professor Vogel adds 3 or 4 drops of strong sulphide of ammonium. If the blood is free from carbonic acid, the two bands near D and E disappear, and a broad faint band appears between where these were; but if carbonic oxide be present, these bands remain unchanged, when the sulphide of ammonium is added.

To test the delicacy of this reaction, Dr. Vogel took the usual mixture of carbonic acid and oxide, as obtained by the action of sulphuric acid on oxalic acid, and mixed it with 60 volumes of atmospheric air, and by shaking two minutes with 2 cubic centimeters of the blood solution, the reaction was very unmistakable. As little as 0·4 per cent of carbonic oxide in the atmosphere can be detected in this way by taking 500 cubic centimeters (about 1 pint) of the air and shaking with 3 cubic centimeters of dilute blood. The quantity of blood required is so small that Dr. Vogel suggests that the experimenter can draw it from himself, or fresh blood can be kept in the laboratory for a week by the use of salicylic acid. The reaction could be rendered more delicate if the oxygen were removed. Carbonic acid is readily detected in this way in tobacco smoke and in illuminating gas.

New Copying Ink.

The best kinds of copying ink are usually prepared by adding a few per cent of alum to an extract of logwood of 10° B., or to a decoction of the same; and then, to improve its copying power, some sugar and glycerin, or table salt is added. Such inks have a violet tint, are purple when first written with, and gradually darken on the paper. The copies taken from them are at first very pale, and only slowly darken.

Professor Gintl states that a new kind of Parisian copying ink has been recently introduced into Germany, which differs from those previously in use in having, while liquid, a more or less yellowish red color; but on paper it rapidly turns blue, and immediately produces a distinct blue-black copying ink. Moreover, it remains liquid a long time; while ordinarily violet copying ink soon gets thick and has sediment in it; this kind copies easily and perfectly.

Experiments and attempts to make this ink lead to the following result, which indicates the method of its manufacture: A logwood extract of 10° B. has added to it 1 per cent of alum, and then enough lime water to form a permanent precipitate. This mass is then treated with a few drops of a dilute solution of chloride of lime (bleaching powder), just enough being added to impart to it a distinct blue-black color, after which dilute muriatic acid is added drop by drop until a distinctly red colored solution is produced. To this solution is added a little gum, and a half of 1 per cent of glycerin. The preparation thus obtained has all the properties of the Parisian copying ink. It is evident that the small quantity of chloride of calcium, formed by this process, greatly increases the copying power of the ink; while the exceedingly slight excess of free hydrochloric acid causes the ink to remain liquid by holding in solution the lime and alumina lakes of logwood. When the writing dries, the acid gradually escapes or is neutralized by the trace of alkali in the paper, so that the blue-black lake is left. It is evident that any considerable excess of muriatic acid must be avoided, as also the use of too much chloride of lime solution.—*Deutsche Industrie Zeitung.*

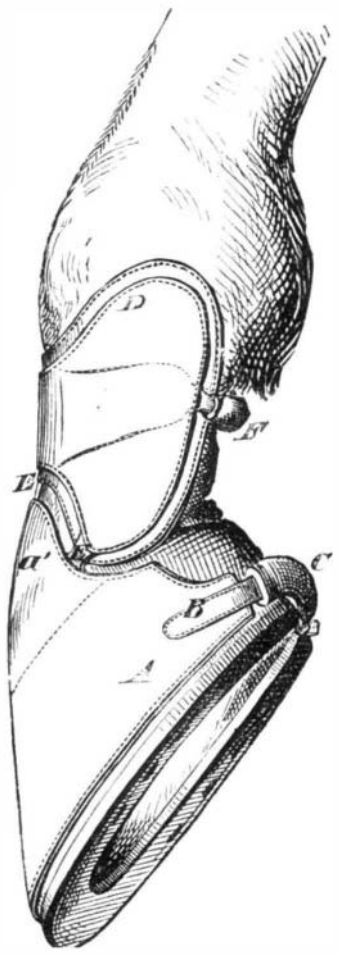
Heated Air Instead of Oxygen in the Lime Light.

Means of producing artificial light of good actinic quality at a moderate cost, without risk of explosion or other danger, must always interest photographers, and many and various experiments made from time to time have been brought under the attention of our readers. The oxyhydrogen light has, of course, satisfied the condition of efficiency; but besides the cost of oxygen there has been the greater objection of risk in its preparation, storage, and use. Mr. Woodbury has recently been good enough to bring under our attention the result of some experiments, by which he hopes to obtain a light, in all respects efficient for lantern purposes and for enlargement, in which, whilst obtaining the brilliancy and the purity of incandescent lime, he dispenses entirely with oxygen in obtaining it.

Mr. Woodbury does not claim to have invented a new thing, but he has made a valuable application of an existing thing. Some of our readers may be familiar with the Fletcher blowpipe, in which a jet of heated air, inside a gas jet, emerges at the same orifice as the gas, into the flame of which it enters, producing an intensely hot concentrated flame. This constitutes the Fletcher blowpipe. The air pipe is connected with an air bag, sending a stream of air through it, finally entering a spiral tube, which twines round the gasburner, both being heated by a Bunsen burner underneath. The intense jet to which we have referred is made by Mr. Woodbury to play upon a lime cylinder, by which is produced a concentrated flame of very intense brilliancy and pure actinic color, admirably suited alike for the sciopticon or other magic lantern, and for photographic enlarging purposes.—*London Photographic News.*

IMPROVED HORSE BOOT.

Mr. Joseph Fennell, of Cynthiana, Ky., has patented through the Scientific American Patent Agency, March 31, 1876, an improved boot, which is herewith illustrated. It is designed to protect the hoof, pastern joint, and fetlock joint from being cut or injured by the overreaching or interfering of the horse when being driven at high speed, and is so constructed as not to chafe or stiffen the joints or confine or cord the leg. It allows sand to pass out readily.



A is the lower or hoof boot, which is so formed as to cover the hoof, to which it is secured by a strap, B, buckled tightly around the heel of the hoof just above the shoe. Upon the strap, B, is placed a rubber tube, C, four inches, more or less, in length, which prevents the strap, B, from slipping. The forward part, *a'*, of the boot, A, is extended upward to cover and protect the corona of the hoof and the pastern joint, which extension, *a'*, is padded to prevent it from chafing the said joint. D is the upper or speedy-cut boot, the lower edge of which is concaved to correspond with the extension, *a'*, of the hoof boot, A, and is connected with the upper edge of said boot, A, by two or more flexible straps, E, so that the boot may not interfere with the proper play of the joints. The boot, D, is secured in place by a small strap, F, buckled around the fetlock, and which is only designed to keep the boot, E, from falling down. The strap, F, is padded, and buckled loosely, so that it cannot chafe or cord the leg. The boot, E, is padded upon the inner side, and is made flaring both upward and downward, so that it cannot confine the sand, but will allow it to pass out freely.

PURIFICATION OF BISMUTH.—M. E. Smith adds to 16 parts of bismuth, kept in fusion at the lowest possible temperature, 1 part of a mixture of 8 parts of cyanide of potassium and 3 parts flowers of sulphur. After fifteen minutes the metal is allowed to cool.