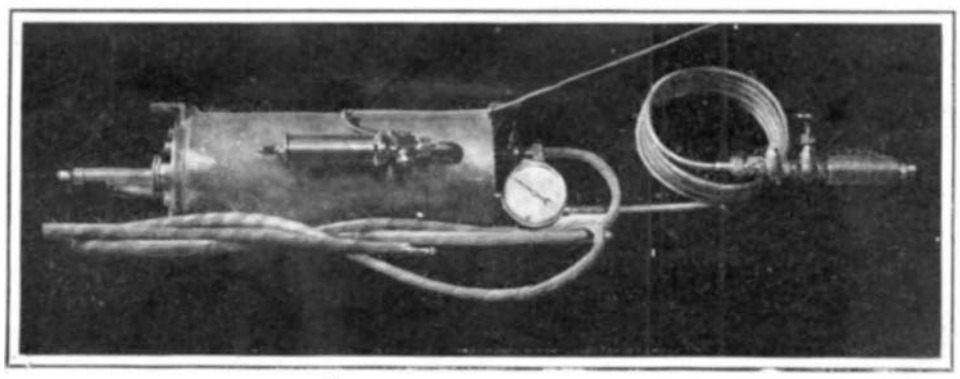
A POWER BRAKE AND WHISTLE FOR AUTOMOBILES.

A novel brake and whistle equipment for automobiles, the invention of Mr. Lewis S. Watres, has recently been placed on the market. The manufacturers have had considerable experience in this line. This company has manufactured for some time a whistle for launches operated by the explosive pressure obtained in the cylinder of the gasoline engine used to propel the boat, and the present device is an extension of this system to the operation of a brake piston arranged to travel in a cylinder placed within and at one end of a cylindrical reservoir. This tank, which is shown in our illustration, is formed of an aluminium casting 15 inches long by 6 inches in diameter and weighing complete 25 pounds. Within it, at the left-hand end, is the 3½-inch bore by 3-inch stroke brake cylinder, the piston of which carries a hollow rod forming its axis and extending beyond the piston a certain distance on either side. The left-hand end of this piston rod extends through the cylinder wall, and is provided with an eye for the attachment of the brake cable, besides having a hole through its wall for connecting its bore with the outer air. The right-hand end of the rod slides in a tube in that end of the brake cylinder, and said tube contains a spring, which returns the piston to the left-hand end of the cylinder as soon as the pressure, which, when let in behind it at that end, causes it to move to the right, is released. A small hole in the hollow piston rod on the right-hand side of the piston allows of the escape into the atmosphere through the rod of the air, which would otherwise be compressed when the piston moved to the right. The tank is connected to the engine cylinder by a copper pipe having a brass flanged radiating section, containing several layers of wire gauze, placed next to and connected to the copper pipe through a special steel check valve. The wire gauze keeps the flame from passing through the check valve and igniting any explosive gas mixture that might reach the tank if the engine is a multi-cylinder one, and the cylinder from which the pressure is taken should not be firing for a time. The connection to the engine cylinder is made through the compression relief cock, or by drilling a small hole in the cap above the inlet valve. The pressure in the reservoir will reach 80 or 90 pounds per square inch with a four-cycle engine, and about 125 with a two-cycle when running under a light load. If the load on the engine is a heavy one, the pressure may run up to 200 or 300 pounds. It is obtained in a couple of minutes after the engine is set going. The pull obtained on the brake rod is about 800 pounds with a pressure of 100 pounds per square inch in the cylinder. With the pressure as low as 40 pounds per square inch, the brake will operate successfully a number of times. The valve through which the compressed gas is let into the brake cylinder is a type of three-way valve, consisting of an ordinary poppet valve having a hollow stem into the top of which fits a small plunger carrying a ball that seats in a socket formed on the top of the valve-stem. The ball valve thus formed is normally open for the purpose of allowing the compressed gas to escape from behind the piston. When the end of the valve-opening lever moves downward, it first depresses the plunger until the ball on the latter becomes seated and prevents the escape of the compressed gas through the hollow stem. A further movement of the lever opens the poppet valve, and the compressed gas enters the brake cylinder. As soon as this valve closes, the pressure is allowed to escape from the brake cylinder through the hollow stem. Thus the brake is sure to be released the moment the poppet valve is closed. Both the valve and whistle are operated by cords running to the steering column. If it is desired to inflate the tires, a connection can be made to a cock on the right-hand end of the reservoir. The tire-inflating pipe is shown attached to this cock in the illustration. The outfit makes it possible to use the pressure obtained in the engine cylinder for three different purposes besides the propulsion of the car.



COMPRESSED GAS RESERVOIR CONTAINING BRAKE CYLINDER FOR AUTOMOBILE POWER BRAKE AND WHISTLE.

A novel device, the object of which is to remove the discomfort of steering an automobile in cold weather, owing to the hands becoming numbed by contact with the metal of the wheel, has been patented by an English inventor. The steering wheel is warmed by the water after its passage through the water jackets of the engine. This is done by means of a flexible tube connected to a hollow spoke, from which the water flows round the wheel, thence returning to the water tank. It is claimed that in half a minute the wheel is rendered thoroughly warm. This invention promises to be largely adopted in public service automobiles, where great inconvenience arises in wintry weather from this cause.

A Plate-Glass Machine.

An invention which will prove of great interest to the glass-making industry has been devised by M. Emile Fourcault, honorary engineer of the mines at Lodelinsart, near Charleroi. By means of this device the manufacture of sheets of glass by machinery, ready for use within half an hour of the incandescent state of the material, is rendered possible. The Fourcault machine can turn out continuously sheets of glass 39½ inches wide, of any desired length, and of a uniform thickness, varying from 1-16 to 5-16 of an inch. This glass can be obtained as rough glass for making extra thin glass, as horticultural glass, and window glass for certain export markets.

The Fourcault machine is essentially simple in design. There is a box of firebrick material which floats on a "springing fountain" of glass. In the bottom of this box is an orifice called the stretcher, and through this a sheet of plate-glass is introduced into the molten mass. The immersion of this sheet of glass causes the plastic molten fabric to adhere to it. When, therefore, the glass sheet is withdrawn in a vertical direction, it causes a nap of melted material to well up through the orifice without any effort, and this operation will continue as long as there is any molten glass in the well beneath, without any further dipping of the glass sheet in the stretcher. The "springing fountain," as it is called, comprises a well or pit. The molten material serves to heat the walls thereof so that the whole mass is in a heated condition. On the top of this pit is the apparatus which serves the dual purposes of dragging the glass up and annealing it.

This portion of the invention consists of a chimney to draw off the heat. In this chimney is placed a series of seventeen pairs of rollers. The plastic material in rising passes between these rollers, gradually cooling meanwhile, and by the time the mouth of the chimney is reached the glass is sufficiently cool to enable it to be cut off with a diamond into any required sizes. The annealing process is carried out simultaneously in the machine. As the molten glass issues from the pit it congeals and slowly cools, and soon loses its heat and the first pair of rollers through which it passes are of the same temperature as the glass itself. This arrangement overcomes the great difficulty in the present system of annealing in which the glass is brought into contact with tools and handled in a temperature considerably lower than its own. By the Fourcault method the glass when it reaches the top of the chimney is perfectly flat, and is equally bright on either side.

Utilizing Nitrogen from the Air.

In a recent article by Dr. K. Arndt in Dingler's Polytechnisches Journal, the process designed by Prof. Frank is discussed, according to which nitrogen is led over heated calcium carbide, thus obtaining a compound of calcium carbon and nitrogen (calcium cyanamide) called "lime nitrogen" by the inventor. The raw product, which contains from 20 to 21 per cent of nitrogen, can be used immediately as manure, when the following instructions should be attended to: On one hectare there is spread out 8 to 14 days before the sowing 150 to 300 kilogrammes of lime nitrogen (according to the condition of the ground) being mixed with about a double quantity of dry soil, and plowed immediately into the ground to 3 to 5 inches depth. A large factory is to be taken into operation in Italy in the course of this year, where 3,000 horse-power is to be used for the production of lime nitrogen. According to Frank's data, one electrical horse-power per hour will give during a year 1,250 kilogrammes of lime nitrogen. The product should be protected against moisture, lest some nitrogen be lost in the form of ammonia.

Whereas this process requires enormous amounts of electricity, Nature herself dispenses with such a large apparatus. In fact, the bacteria dwelling in the root nodules of leguminosa work the nitrogen of air, preparing from it food for their hosts. Hiltner of Munich succeeded in obtaining from these nodules considerable amounts of a substance by means of which he expects to find a biological process liable to compete with the above chemical method for the utilization of atmospheric nitrogen.

A MODEL PHOTOGRAPHIC LABORATORY.

BY C. H. CLAUDY.

The recently completed photographic department of the Geological Survey at Washington is a model plant in every respect. It represents the height of convenience, the greatest availability of apparatus for the greatest possible amount of use, and the largest possible economy of effort for the required output. This state of affairs exists as the result of most careful planning by the chief of the division, Mr. Norman W. Carkhuff, who has spent the five years during which he has been in charge of the work in tireless endeavor to save time and expense, and increase output.

Everything in this establishment is calculated to increase the efficiency of the individual workman. The apparatus is so arranged that the minimum of time is required for its correct adjustment, and the worker is made comfortable in every way possible, it being the theory that good air, plenty of it, and a cool temperature make for better work than hot, stuffy, and uncomfortable quarters; a fact which every one who has ever worked in an improperly constructed dark-room will at once appreciate. Nothing has been of too small a nature to receive attention, the littlest details, such as the size of the lens boards, the height of the cameras, etc., having been most carefully thought out. The entire result is a laboratory and photographic gallery which is unique in every way.

A more particular and detailed description follows, which should bring out these points. It must be mentioned, however, that in one respect this workshop, or series of workshops, is not as good as might be desired, and that is in the question of available floor space. The Geological Survey occupies the greater part of a privately-owned business building in Washington, which is too small for the immense interests it contains. Consequently, the photographic department is crowded into smaller space than it should be.

Entering the department, the visitor passes through the office to a door which can only be opened from the inside, except by those who know how. Passing through this portal, the visitor will find himself in a long and narrow passage, from which open doors, leading to the various rooms. Proceeding along this passage to the left, you enter the gallery, where the first work is done. Here are two large cameras, each taking a plate 28 x 34 inches in size. These cameras slide back and forth on tracks, where they can be instantly locked in position at any point. The fronts of both these cameras are movable up and down, and back and forth, which movements are controlled from the rear by means of revolving rods connected to gearing. This simple idea took considerable working out, but the mechanism was finally simplified to a practical working basis. The result is a saving of several hours a week, otherwise spent by the workmen running around the camera from under the focusing cloth, to adjust the position of the lens. There are twelve lenses in this department, ranging from 20 millimeters to 31 inches in focal length. Except those used only in microscopical photography, every lens in the place is on its own front board, and every lens will fit every camera, without any adjusting, another simple feature which saves much time. The plate holders for these cameras are heavy affairs, naturally, and usually take two men to carry them. Here, however, they are suspended from an overhead trolley line, which runs both lengthwise and transversely, so that they may be carried from dark-room to camera and back again by one man with the greatest ease. The plate holder remains hooked to this trolley all the time. Instead of being carried around the passage and into the wet-plate dark-room, that room has an opening in its wall, leading into the gallery, into which the plate holder just fits, and where it can be instantly locked to make a light-tight joint. The plate is prepared in the dark-room, slipped into the plate holder, which is then closed, and, if desired, the opening can then be closed also, with a shutter, keeping the dark-room light-tight when the holder is removed. Stepping into the gallery, the workman unlocks the holder, and simply pushing it on its trolley guides it to the camera he wishes to use. A slight pull on a handle raises it the inch necessary to fit it over the dowel pins, and the work is done. The opening in the dark-room is at the exact height that the plate holder is, when suspended from the trolley. The amount of work saved by this system is incalculable, but it amounts to a very large percentage. Besides requiring the services of only one man, it enables him to work with the utmost dispatch.

The trolley system is also applied to the electric lights used to illuminate the copying boards. These lamps can be placed in any position anywhere about