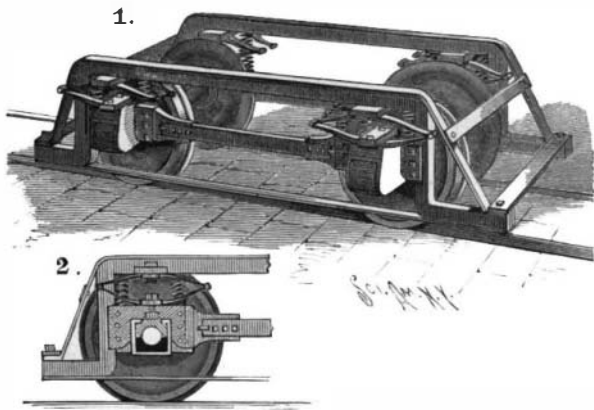


AN IMPROVED CAR TRUCK.

This truck is designed to reduce the friction of the bearing parts to a minimum and take up the side and end thrust, relieving the truck frame of the heavy strain incident to the motion of the car. It is intended more especially for use on street railway cars. A patent has been granted for the improvement to Mr. George B. Esterley, No. 28 Hartwell Street, Fall River, Mass.

The sides of the frame each consist principally of a single bar of square steel whose vertical sides terminate in horizontal ends, as plainly shown in Fig. 1, and in each of the sides are two car axle boxes, rigidly connected by bars fastened by bolts to the boxes, there being a key at the end of each bar to facilitate its proper adjustment with the boxes, and the holes through which the bolts pass in the boxes being slightly elongated for this purpose. The axle boxes

**ESTERLEY'S CAR TRUCK.**

have their outer ends fitted to slide on the inner faces of the vertical portions of the frame, and on the top of the axle brass, as shown in Fig. 2, is a lug fitting in a recess in the under side of the top of the box, this lug engaging a vertical bolt in the top of the box, to prevent accidental displacement of the axle brass in the box.

Above each box are elliptical and coiled springs adapted to sustain the load, dividing the strain with the boxes and thus relieving the truck frame. To take up any side thrust, a thrust plate is fastened to the outer end of each axle box, the plate extending into the outer face of the vertical portion of the frame, and another thrust plate is also secured to the inner face of each axle box to engage the inner face of the vertical portion of the frame. An oil casing, having at its rear end an opening for the passage of the axle journal, has at its front end a door for the introduction of the lubricant, the top of the casing having an aperture through which extends the top of the axle brass. The outer faces of the sides of the oil casing fit snugly on the inner faces of the sides of the axle boxes, and on the rear end of the casing is a dust plate. With this improvement the axle brass is readily removable for examination or renewal when desired.

Why the Maple Sap Flows.

The maple tree is active in the summer and passive in winter. Pressure, suction and zero are conditions of the tree when not in leaf, when at rest and passive. Varied weather, as to temperature, is the cause of these varied conditions. Under certain conditions the whole tree may be in pressure, or the whole tree may be in suction, or it may stand at zero. Again, a part of the tree may be in pressure while another part of the same tree may be in suction.

When the tree is in pressure it is throwing out moisture sap whether tapped or untapped. When the tree is in suction it is reversed, taking in moisture or water whether the tree is tapped or not. When the tree is tapped the pressure becomes visible. To make the suction visible, connect a glass tube to the spout (a round wooden one) by rubber, fill the tube with water or sap, or even sirup (when the tree is in suction), and you will see the contents passing down the tube, and of course the same is passing into the tree. Pressure and suction exist all the same if the tree is not bored, but, being unseen, it is recognized little even by vegetable physiologists.

Pressure can be measured with the steam gage, and also with a mercurial gage, while suction can be measured with a mercurial gage only.

The highest pressure that I have noticed was 34 pounds on a square inch. This would hold a column of water over 60 feet high. The pressure of the atmosphere at the sea level is 15 pounds upon a square inch. This amount of pressure is exerted on every square inch outside surface of the tree, and is balanced by the same amount of internal pressure, so that the 34 pounds pressure, internal, was in excess of the outside pressure; hence, even if the tree is not tapped, there must be moisture passing to the surface through the pores and connecting with the atmosphere until equilibrium is restored, and suction or zero is reached.

If certain conditions produce pressure, then reversed

conditions must produce suction, the opposite condition. When the tree is neither in pressure nor suction, then its condition is zero. In good sap weather, as a general law, the tree is in pressure during the day and in suction through the night. In poor sap weather zero conditions prevail.

Pressure. What is it? This can only be understood by an understanding of the internal makeup of the tree. It is supposed that there are 120,000,000 cells in every cubic inch of maple wood. These cells are supposed to be like small boxes, with covers, piled one upon another, so that there are two partitions between every box or cell. These cells are filled with gases, air and water, together with some other materials or elements. Now, then, we are prepared to understand the philosophy of the pressure. As the sun warms up the outside of the tree, the air and gases expand in all the cells so warmed up, occupying a larger space, so that the pressure must be proportionate. It is not so much the expansion of the cells as it is their expansible contents.

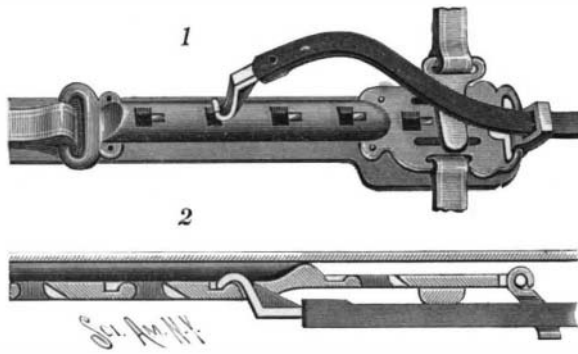
The moisture or watery parts are forced out through the pores of the tree, and if a small maple tree is carefully scraped to the wood, instantly the whole surface will be covered with tiny drops of moisture, showing what is taking place all over the surface. If, then, a tree is bored, the pressure is liberated so much, and if a gage is attached to the tree, it will show it, and even measure the amount. Now, then, a vacuum results. As a cool night is coming on these expansive elements are contracting, thus doubly increasing the vacuum. Now, then, pressure changes to suction, and the glass tube shows it. The equilibrium of the tree is restored.—New York Tribune.

The Bicycle Lamp.

"There is a fortune awaiting the man who can invent a really good bicycle lamp," said the instructor. "The best one made is the searchlight, which cannot be bought for less than \$5; it is the only one in which kerosene can be burned, sperm oil being used in the others. The great advantage of the searchlight is that it is less liable to go out in running across car tracks, ruts, or rough places, but a sudden jerk often extinguishes the light in this, as well as in the cheaper and less ingenious lamps. The truth of the business is if cyclists could buy a well perfected lamp there would be none of these arrests of persons for riding without lights. Lamps cost all the way from \$1.50 up to \$7, and will hold enough oil to burn about four hours."

AN IMPROVED HAME TUG.

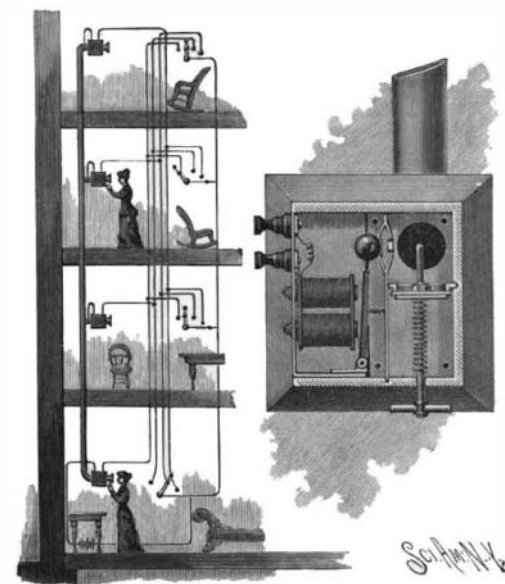
The hame tug shown in the illustration permits of readily shortening or lengthening the trace, causes a straight pull from the hame to the singletree and simplifies changing the back band from one harness to another. It has been patented by Mr. Charles Hoberrecht, Sedalia, Mo. The tug is made with a plate riveted to a band of leather, there being in the plate a series of apertures, each terminating at its rear end in a slot with beveled back, the apertures being adapted for engagement by a hook at the front end of the trace, as shown in Fig. 1. The hook has at its rear a brace which rests in the slot at the rear of the aperture with which the hook is engaged, as shown in the sectional view, Fig. 2, a double bearing being thus made in the tug plate, and the accidental detachment of the hook being prevented. At the outer end of the head of the plate the trace passes through a guide loop which may be turned up or down or toward the front or rear to insure a straight pull, and the trace may be hooked upon the guide loop to make a longer hitch. At the forward end of the tug plate is an angularly arranged loop to be engaged by a strap connected with the hame, the eye formed by the strap being held out so

**HOBerecht's HAME TUG.**

as not to injure or rub the skin of the animal. On the lower side of the plate is an opening engaged by the belly band, and in the plate are two slots engaged by the buttons of a buckle, which has an eye engaging the saddle or back band, the latter being thus permitted to slide backward or forward to fit large or small horses. The arrangement is such as to permit the back band to be readily changed from one harness to another without unbuckling the billets or the strap-work on the harness saddle and without danger of accidental displacement.

AN ELECTRICALLY CONTROLLED SPEAKING TUBE.

The improvement represented in the illustration permits of conveniently connecting with each other any two rooms in dwellings, stores, hotels, apartment houses, etc., or the apparatus may also be arranged in connection with a central office, in which case an alarm may be sounded in each room for fire or other cause. The invention has been patented by Mr. George S. Williamson, of McKeesport, Pa. The engraving shows a section of an apartment house in which the improvement is in use, the small figure being a sectional front view of the signal box, in which is inclosed a speaking tube inlet and mouthpiece, a valve controlling the connection between the mouthpiece and whistle, while an electric circuit is provided with electromagnets, the armature lever being controlled from the whistle. On each of the floors the main tube is connected by a branch tube with a signal box whose mouthpiece opens into a chamber which is disconnected from an adjoining chamber by a spring-pressed valve, the valve being opened by a handle extending through the base of the signal box. In the wall of the second chamber, and between it and a third chamber, is a whistle, there being in the latter chamber a pair of magnets and an armature lever carrying a ball closing the inner aperture of the whistle, so that when a blast of air passes into the second chamber, either from the branch tube or from the mouthpiece—

**WILLIAMSON'S ELECTRICALLY CONTROLLED SPEAKING TUBE.**

the valve being then open—the air sounds the whistle, provided the armature lever is being attracted by its magnets. The latter are connected with switches on each floor, a wire connecting the several switch levers with each other and with a wire leading to the battery, the main tube also serving as a conductor. A party on any of the floors can thus, by moving the switch lever to the desired contact point of another floor, call up the party thereon to establish communication between the two floors, the completing of the circuit attracting the armature lever and permitting the sounding of the whistle in the signal box of the floor to be communicated with. When the improvement is arranged for use in connection with a central office, there are no switchboards on the several floors, and the wires terminate at the switchboard in the central office, where the connection is made by an attendant.

Test for Arsenical Wall Papers.

Anyone who suspects the presence of arsenic in their wall paper can put the accuracy of their suspicion to the test in the following simple manner: Dip a small piece of the paper in strong ammonia water. If arsenic is present, a bluish color will appear. In order to make doubly sure, a crystal of nitrate of silver can be moistened with a drop of this fluid. This further test will show if the color is due to arsenic, as, if it is, a deposit of yellow tint will be formed on the crystal.—Exchange.

[The above is a good instance of fallacious chemical tests which appear from time to time for the "information" of the public. The blue color produced by ammonia simply indicates copper, and a test for copper cannot be accepted as a test for arsenic. The nitrate of silver reaction is far from easy to produce satisfactorily in the laboratory; a fortiori, it is not to be recommended for use by the unprofessional. The best test for arsenic in wall paper is to send a sample to a competent chemist for analysis.—Ed. S. A.]

LAVOISIER, the chemist, is to have a statue in Paris, the Institute of France having started an international subscription for the purpose. It was a hundred years ago last year that the Revolutionary Tribunal sent him to the scaffold, refusing his request for a delay until he had completed his experiments. Fouquier Tinville then declared that the republic had no need of learned men.