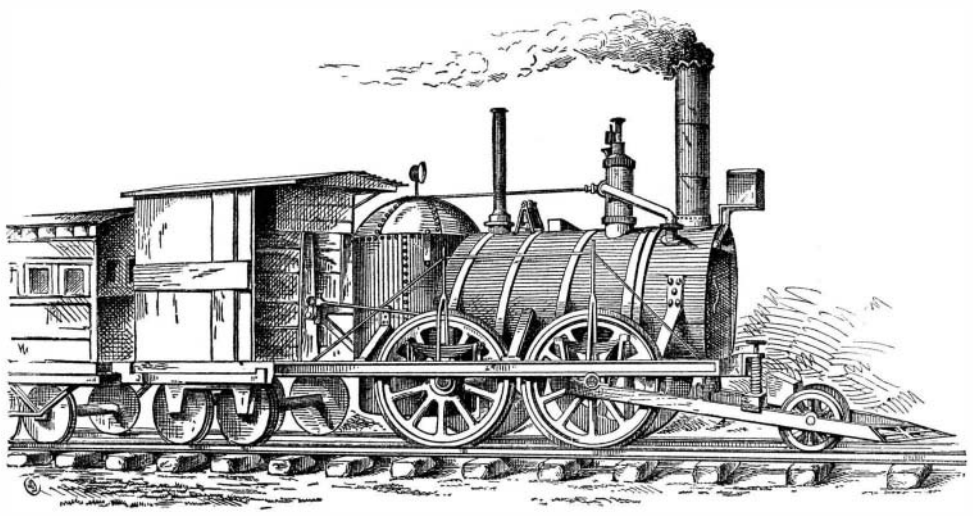
THE "JOHN BULL" LOCOMOTIVE AT THE CENTENNIAL.

The annexed engraving represents a curious old relic of early railroading in this country, which attracted considerable attention during its exhibition at the Centennial. It is the locomotive "John Bull," built by George and Robert Stephenson, at Newcastle-on-Tyne, England, for the Camden and Amboy Transportation Company, and shipped to Philadelphia in 1831. From Philadelphia the machine was carried in a sloop to Bordentown, N. J., and, being packed in wagons, was hauled out to the only piece of permanent track of the Camden and Amboy company then completed, a line about ¼ of a mile in length, and situated about 1 mile from Bordentown. The machinery was put together on the track, and a tender was constructed from a whisky hogshead placed on a small platform car which had been used by the contractor in building the road. The connection between the pump of the locomotive and the tank was made by means of leather hose fitted up by a Bordentown shoemaker.

Steam was first raised in the boiler on September 15, 1831, and after several trial trips the first public exhibition took place on November 12. R. L. Stevens acted as conductor and general director, and the entire New Jersey legislature were present as witnesses. The "John Bull" remained in Bordentown until 1833, and was occasionally used elsewhere until as late as 1866. The cylinders are 9 x 20 inches, and the driving wheels 4 feet 6 inches in diameter, with hubs of cast and tires of wrought iron. The entire weight of the locomotive is 10 tuns.

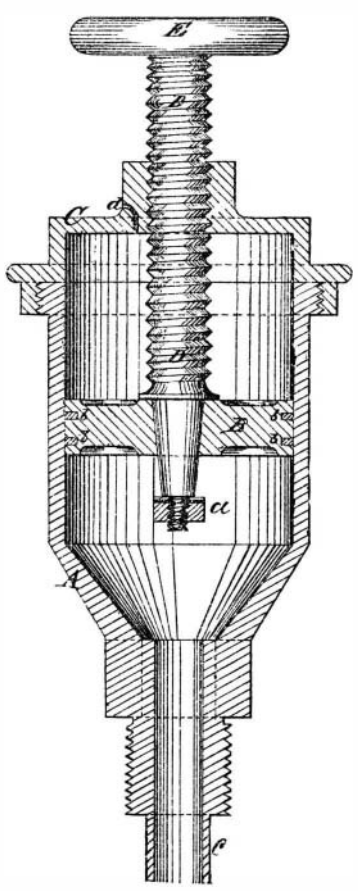
With the old machine was exhibited a portion of the original track above mentioned. The rails were rolled in England, and were supported on stone blocks prepared at great expense, wooden ties not being deemed safe.



THE "JOHN BULL" LOCOMOTIVE.

IMPROVED LUBRICATOR.

Mr. George C. Johnson, of Portland, Me., has patented through the Scientific American Patent Agency, September 26, 1876, an improvement in lubricators, by means of which a dense lubricating compound can be forced into journal boxes. A, in the annexed engraving, is a cylinder of brass, bored to receive the piston, B. A cap, C, is screwed to the top of the cylinder, A, and D a screw provided with the hand wheel, E, and fitting a screw thread cut in the center of the cap. The lower end of the screw is made conical, to fit a seat in the center of the piston.



The conical part of the screw is longer than the thickness of the piston, projects a short distance below, and is provided with a nut and washer, *a*, to prevent the piston from leaving it. Grooves, *b*, are cut in the piston to receive packing rings.

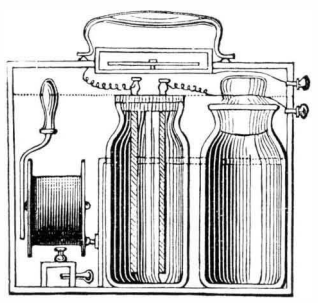
The lower end of the cylinder, A, is made conical or funnel-shaped, and is provided with a threaded tube, *c*, which screws into the journal box. An aperture, *d*, is made in the cap for the admission of air. The cylinder, A, is filled by removing the cap and piston, and the lubricant is forced into the journal box, through the tube, *c*, by forcing down the piston, by means of the screw. Should the journal heat, the lubricator becomes warm, melting the lubricant, allowing the piston to drop to the nut, *a*, leaving a space between it and the conical part of the screw, through which air may pass.

GALVANOMETER FOR TESTING LIGHTNING CONDUCTORS.

The preliminaries necessary to testing lightning conductors are often troublesome, the apparatus required for it being rarely obtainable in handy and convenient form, though, indeed, little apparatus is required: merely a galvanic element, a galvanometer, and a sufficient quantity of insulated copper wire. The firm of Mittelstrass Gebrüder, in Magdeburg, Germany, have recently combined the essential parts in a galvanometer chest, the arrangement of which (described in a recent number of Dingler's *Polytechnisches Journal*) is as follows: In front, the lid is fastened with two hooks. At the side are two binding screws for attachment of copper wires. On the top is a sensitive galvanometer, the needle of which can be arrested with a screw. In the interior of the chest stand two glasses (see engraving) with equal width of neck, so that the glass stopper in one may may be readily transferred to the other, so as to close it. In the one glass is a suitable solution of bichromate of potash; in the other is the carbon and zinc element, from which spirals of wire proceed to the binding screws as indicated. It is easy to lift the element out of the empty glass into the one filled with liquid, and so produce a current. In the third division of the chest is a roller with silk-covered copper wire, which can be easily wound off, and, with the aid of a small handle, wound on again. Lastly, a binding screw serves for connecting the line to the wire rope of the lightning conductor.

Where desirable, the arrangement is so completed that only one turn of the conducting wire round the galvanometer needle is inserted, or all the turns, which can be done in a moment by turning a binding eye on the upper side of the chest. Lastly, on the under side of the lid may be introduced two resistance coils of one to ten Siemens' units, which, again, may be similarly inserted or excluded.

In testing a lightning conductor, the process is as follows: 1. The wire is unwound from the roller, drawn up to the roof, and the end of it wound about the point of the conductor. 2. The chest is opened, the element lifted over into the salt solution, the chest closed again, and so placed that the needle is still; then the binding screw of the roller is connected with that of the chest with a piece of wire. 3. By means of the small binding screw in the bottom of the chest, a wire is connected with the lower part of the wire rope of the lightning conductor, and is brought to the second binding screw of the chest. If there be perfect electric connection between the upper point of the conductor and the lower parts, the needle will be deflected. Should the deflection not occur, the place of interruption is sought for by connecting the lower binding screw with the wire at successively higher points. 4. For investigation of the earth conduction, the point of the lightning conductor is excluded, by detaching the wire and connecting it with a neighboring gas chandelier, an iron spring, or an iron rod forced deep into the ground, and then the circuit is completed as before. The deflection of the needle will be greater, the more perfect the earth conductor. Important advantage is here derived from the above mentioned arrangements for insertion of the resistance coils, or only one or the whole of the galvanic windings. After use, the element is lifted back out of the solution into the empty glass, and the galvanometer needle again arrested.



How Psycho is Worked.

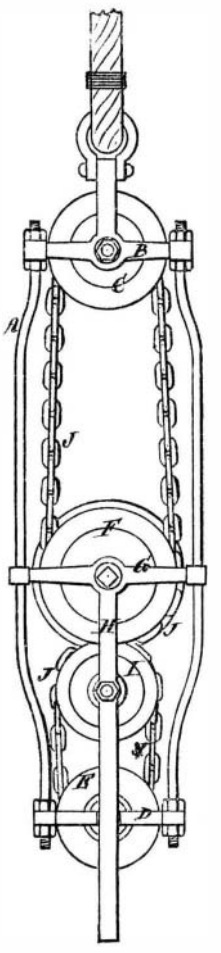
It will be remembered that not long ago we illustrated Messrs. Maskelyne and Cooke's famous automaton Psycho, which has been exhibited in London, and which has puzzled every one who has attempted to explain its interior mechanism. The figure is seated, cross-legged, on a cushion which is supported by a hollow clear glass cylinder, so as to show that no mechanical apparatus connects the automaton with the space beneath the stage or platform where a manipulator might be concealed. It has often been conjectured that the motive power was compressed air forced up through the cylinder, and this connection was strengthened when a prying Yankee, in one of Mr. Maskelyne's audiences, requested to be allowed to place a newspaper beneath the lower end of the tube, which request the exhibitor refused. Subsequently, however, the compressed air adherents were thrown into confusion by Maskelyne withdrawing his refusal and allowing the insertion of the newspaper. Now the London *Spiritualist* returns to the charge, with the same theory advanced in a new way. Psycho, its says, "is worked by varying the pressure of the air inside the glass cylinder on which the automaton stands; the compression of the air acts like a push, and the partial exhaustion of the air acts like a pull. The pushing and pulling action of this invisible rod—for committee men are not like provincial pigs, able to see the wind—the push and pull of this rod, we say, starts and stops clockwork machinery at the proper moment inside the automaton. The air enters and leaves the glass cylinder through the green baize or other fabric on which the cylinder stands, portions of the air channel being concealed under the baize. There are two ways of working the figure. In the one case, the pedestal may be directly connected with the air pump apparatus by means of a pipe passing through the stage. In the other case, the figure may stand upon a pedestal connected with no pipe. Compressed air is then contained in a metallic vessel inside the pedestal, and its escape is permitted or stopped at will by means of an electro-magnetic valve. To work this valve, the feet of the pedestal are connected with fine wires running through the stage to the battery and the electrical commutator.

"Any committee men who wish to stop the working of Psycho can do so by placing a large folded newspaper over the top of the pedestal, so that air cannot be blown backwards and forwards into the bottom of the glass cylinder; but they must watch closely that Mr. Maskelyne does not punch a hole in their newspapers to let air through. Another way of stopping the working of Psycho is to mount the bottom of the glass cylinder upon three or four bungs, which anybody may take in his pocket to the Egyptian Hall. If the bottom of the cylinder is thus removed from the surface of the green baize, no blowing of air through the baize will much vary the pressure of that inside the cylinder."

The *Spiritualist* ought to be expert in matters of this kind, and therefore we look upon its opinion as semi-professional. In any event it is the most plausible elucidation of the mechanism that has yet appeared.

A NEW TACKLE.

We illustrate herewith a novel apparatus for setting up ships' rigging, which may also be applied to any purpose where heavy weights are to be moved over small distances. It was patented October 3, 1876, through the Scientific American Patent Agency, by Mr. Thomas F. Hall, of Omaha, Neb. A are two guide rods, the upper ends of which are connected by bars, B, to and between which is pivoted a pulley, C. The lower ends of the rods, A, are connected by bars, D, to and between which is pivoted a pulley, E, the pulleys, C and E, being thus always kept at the same distance apart. F is a double chain pulley, the two parts of which are of different diameters. The double pulley, F, is arranged between the crossbars of the frame, G, at the ends of which are arranged the rods, A, which are capable of sliding up and down through the frame. Between the bars, H, are pivoted pulleys, I, at such distance from double pulley, F, that the chain, J, can pass between them freely. J is an endless chain which passes over the pulley, C, and the parts pass down upon the opposite sides of the double pulley, F, one part passing along the groove of the part of said pulley of greatest diameter, and the other part passing along the groove of the part of the pulley of smallest diameter. The parts of the chain, J, pass or cross each other between the pulleys, F and I, pass down upon the opposite sides of said pulleys, I, and around the pulley, E. The power is applied to the shaft of the double pulley, F. The crossbars or frame, B, is connected with the rigging or weight, and the end of the frame, H, is connected with the side of the vessel or support. As the pulley, F, is turned in one direction, it moves slowly up the chain, J, toward the pulley, C, drawing the frames, G H, toward the bars or frame, B, slowly, but with immense power, the pulleys, C E, keeping the chain, J, always taut, and the pulleys, I, holding the said chain in place upon the pulley, F.



Smoky Stoves.

There is a very simple way of avoiding the disagreeable smoke and gas which always pours into the room when a fire is lit in a stove, heater, or fire place, on a damp day. Put in the wood and coal as usual; but before lighting them, ignite a handful of paper or shavings placed on the top of the coal. This produces a current of hot air in the chimney, which draws up the smoke and gas at once. Not one person out of fifty ever thinks of this easy expedient.

IRON is a dangerous ingredient in fire brick. When a brick containing iron is exposed, even at a low temperature, to gases containing carbon, part of the carbon is deposited near the iron. This has often not only caused the brick to lose its cohesion, but may even burst it so as to throw down the iron walls of furnaces and the linings of flues.