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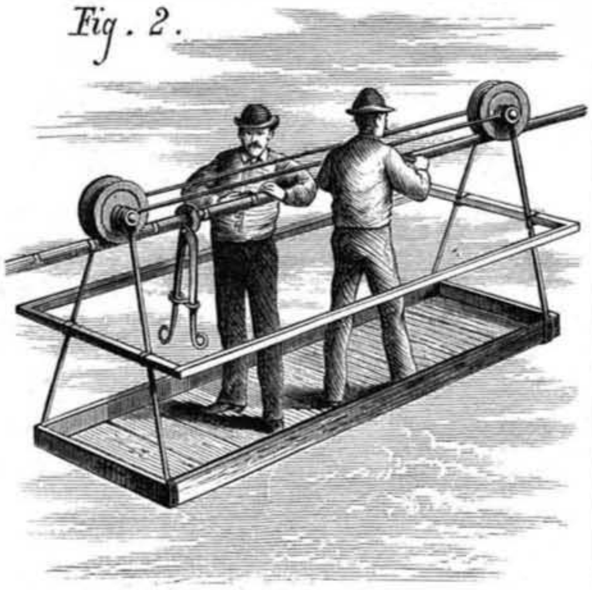
**CABLE MAKING OF THE EAST RIVER BRIDGE.**

The stage of work through which the great East River Suspension Bridge is now passing may be considered that which includes the first permanent steps toward the formation of the superstructure or bridge proper. Hitherto piers and anchorages have been erected, the river spanned by a slender foot bridge, and the attendant temporary guys and braces, but until the last few days it has been impossible to say that any integral portion of the vast mass of suspended wire has reached a finished state. Now, however, two huge strands, respectively belonging to two huger cables, are permanently fixed in their great shoes pinned between the colossal eye bars of the anchorages, and fixed in the graceful curve with which they sweep over the river, their centers marking the lowest point of the majestic structure which they are to aid in supporting. In order to clear up any doubt in the reader's mind as to what the main cables and their office are —for to these the strands now finished belong—it may be well to explain that the bridge is to be held up by four immense wire ropes, or more strictly bundles of wire, for, contrary to general supposition, there is no twist in them. These cables pass from anchorage to anchorage, rising over the tops of the piers, two crossing the latter near the middle and one at each end. Their course can easily be followed on the engraving of the bridge as it will appear when finished in our next issue. It will be seen that the roadway which extends straight across the river from floor to floor of the great arches to the piers, and then from piers to anchorages, is suspended by smaller vertical cables of constantly varying length.

Each one of these mighty principal supporting ropes is composed of nineteen strands, and each strand is made of 260 steel wires. The size of wire now used is number 7. Number 8 was first employed, but the larger size was preferred. When these wires are laid side by side, they make a bundle 3

Fig. 2.



inches in thickness, and the weight and tension of the bundle extending as it does from anchorage to anchorage, appears in the shape of a pull of 40 tons at each end. So that each entire cable will exert a strain of just nineteen times that amount.

In this and the following article we propose to explain how these main cables are made, for although we shall describe simply the preliminary operation of strandmaking and securing, it will readily be seen that further operations involve but a series of repetitions.

It may be remembered that after our examination into the way the steel wire was made (the results of which we embodied in an article some months ago) we left the wire in large coils some five feet in diameter. Following these coils now to the Brooklyn anchorage—where is the spinneret whence the great cobweb is emerging thread by thread—we shall find them dipped in oil, dried in the air, dipped again and again until a moderately thick coat of hardened grease has changed their bright zinc lustre into a dirty yellow. Then they are carried up on the top of the anchorage, reeled off on large wooden drums, and from these last they are paid off as required. We have already explained how the first wires were got across the river. One of the first conveniences afterwards put in place was the carrier rope. This is simply an endless wire cable which starts from the Brooklyn anchorage, passes over the two piers in turn, then to the New York anchorage, on top of which are two horizontal pulleys, around which it leads, then back to Brooklyn, and finally after passing around an immense horizontal engine-driven drum the ends are joined. One part of this carrier rope carries wire for one inner main cable, the other part for the corresponding outer main cable. On each part is attached a traveler wheel, which is represented in Fig. 3. This is a light

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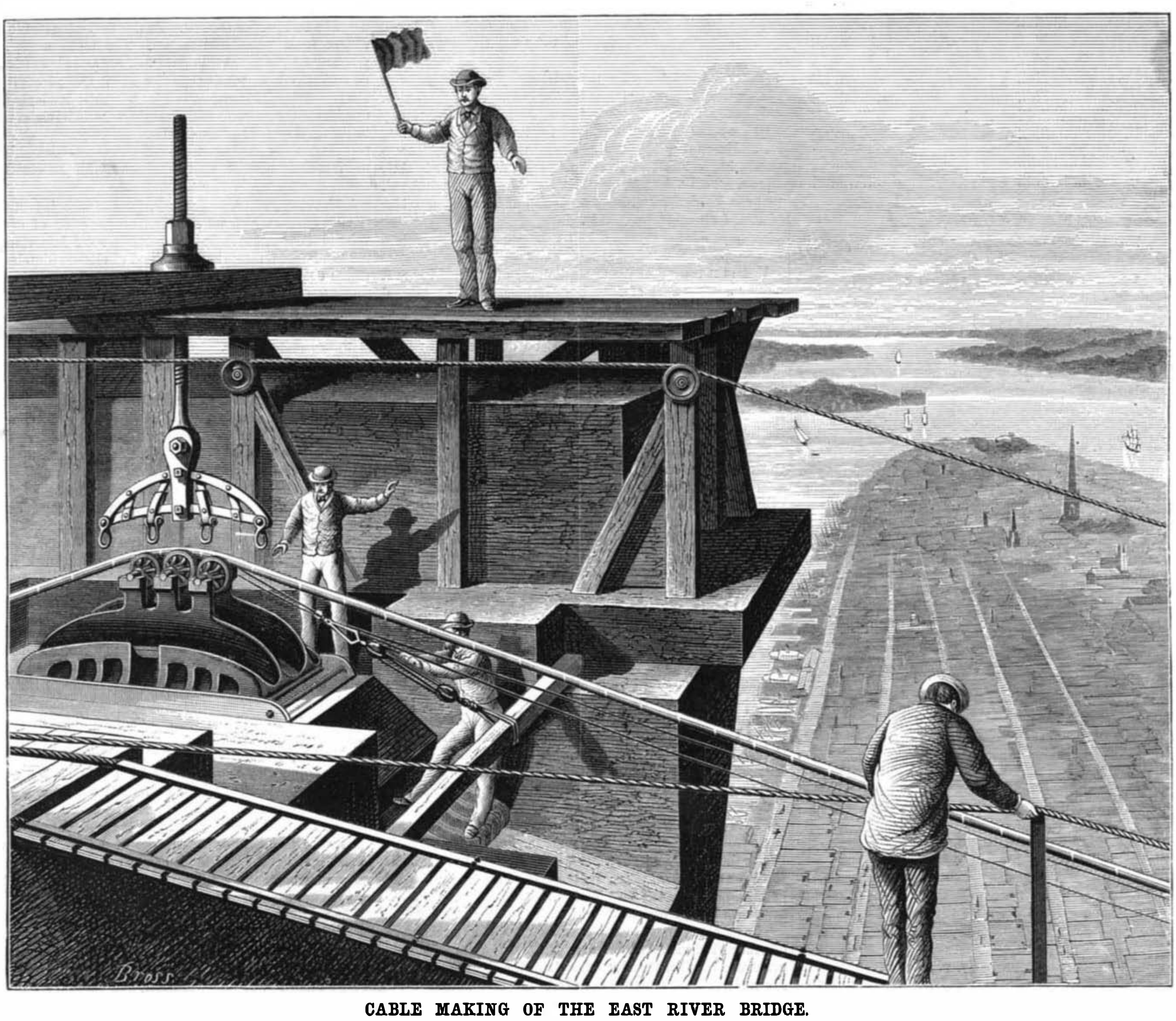
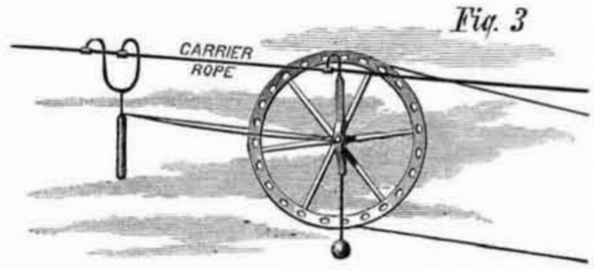


CABLE MAKING OF THE EAST RIVER BRIDGE.

[*Continued from first page.*]

wheel of wood and tin, turning in bearings suspended from the rope; braces are arranged in connection with it to prevent oscillation. Over this wheel the bight of the wire to be laid is passed. One end of the wire is fastened, the other goes to the reel. Now the drum of the carrier rope turns, and the wheel attached to the latter starts on its journey. The wire gradually unwinds from the reel, the wheel goes on over the piers and finally comes to rest on the New York anchorage. There the bight of wire is slipped out of its groove and put around a massive iron shoe—about which we shall have considerable to say in our next article—and then the motion of the carrier rope is reversed and the empty wheel returns. At the same time another wheel carrying another bight of wire for the second cable starts across, and thus the work continues, a filled wheel constantly going out and an empty returning—two strands of two different cables being thus simultaneously made.

*Fig. 3*



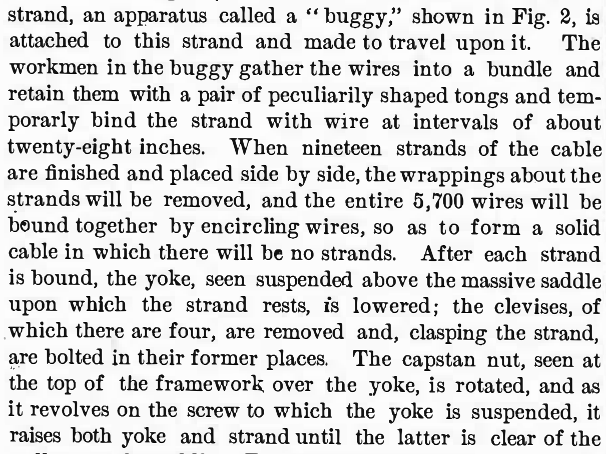

After each wire is laid it must be brought to the same curvature as the wire preceding it. To do this, after the carrier has passed the wire from the anchorage over the saddle at the top of the pier, it is stopped and a tackle attached as shown in the engraving. To ascertain the requisite amount of distance to be raised or lowered from the top of the pier to the anchorage is easily done, and we will suppose the tackle is released and the traveler has passed on its way to the opposite pier, where it is again halted and the tackle attached. Flagmen are stationed on the cradles, of which there are three between the piers, who report by means of pre-arranged moves of their flags to the flagman on the top of the pier the amount of deflection there may be in the wire, and it is according raised or lowered, as may be demanded.

When the requisite number of wires are laid to form a strand, an apparatus called a "buggy," shown in Fig. 2, is attached to this strand and made to travel upon it. The workmen in the buggy gather the wires into a bundle and retain them with a pair of peculiarly shaped tongs and temporarly bind the strand with wire at intervals of about twenty-eight inches. When nineteen strands of the cable are finished and placed side by side, the wrappings about the strands will be removed, and the entire 5,700 wires will be bound together by encircling wires, so as to form a solid cable in which there will be no strands. After each strand is bound, the yoke, seen suspended above the massive saddle upon which the strand rests, is lowered; the clevises, of which there are four, are removed and, clasping the strand, are bolted in their former places. The capstan nut, seen at the top of the framework over the yoke, is rotated, and as it revolves on the screw to which the yoke is suspended, it raises both yoke and strand until the latter is clear of the pulleys on the saddle. The pulleys are then removed and the strand is lowered away into its bed in the saddle underneath the pulleys. The clevises on the yoke are then uncoupled, the yoke raised out of the way, the pulleys put in place, and another strand is laid similar to the previous one.

The saddles, to which reference has been made, are four massive castings resting on the top of each pier, and each one holding in its embrace one of the cables. The pulleys over which the strand passes are used for convenience in laying the strand and are removed entirely when the cable is complete and placed in its saddle. To allow for the difference in unequal contraction and expansion of the cable from anchorage and pier, and between the piers, the saddle rests upon a series of iron rolls, which allow of a change of its place, as the force of contraction or expansion is brought to bear upon it.

### A ROTARY MOULD BOARD PLOW.

Mr. Charles V. Dyer, of Hallsville, Texas, has patented



through the Scientific American Patent Agency, May 22, 1877, the novel plow illustrated herewith. The rear parts of the beams, D, are curved forward to serve as standards for the plows, F. From notches in the top of the plow plates extend pivots which enter orifices in the ends of the cones, H. The latter have spindles, I, which pass through the beams, D, and are surmounted by pulleys, J, to which motion is communicated by an endless chain actuated by the wheels. As the machine is drawn forward, the cones, H, are revolved so as to turn the soil as it rises upon the plows to one side, and at the same time break it up and pulverize it.

### American Institute Exhibition.

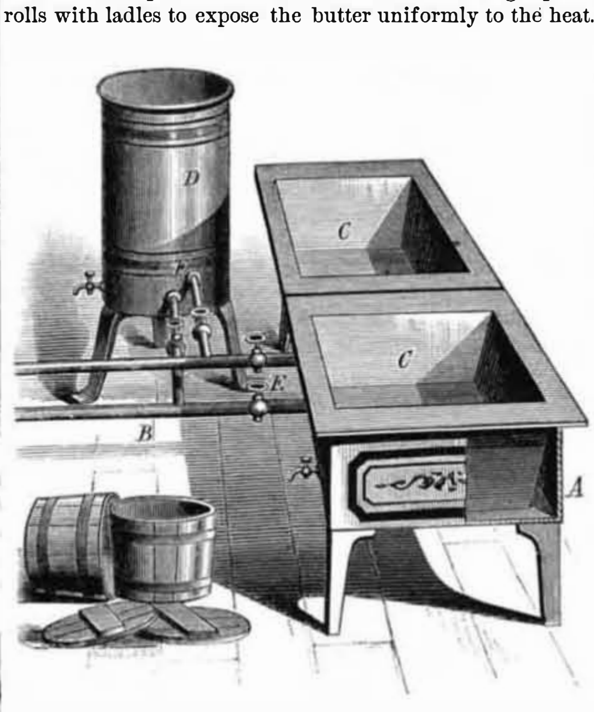
For forty-five years the American Institute of New York has opened its doors and invited American inventors and manufacturers to exhibit their productions; and again this year it renews its invitation to all. To such as wish to reach the capitalist and consumer, they must admit that New York is the place. For details apply to the General Superintendent, by mail or otherwise.

### APPARATUS FOR PREPARING BUTTER FOR PACKING.

The usual way of softening butter for packing is to put it in a room that is heated by a fire to a temperature of from 80° to 100°, which takes from three to five hours to make the butter soft enough for work. Even then the butter is not uniformly softened, as some of it remains hard, while some is melted to oil, which is injurious to the quality of the butter. The invention which is illustrated is intended to obviate this defective feature. It consists of pans for holding the butter heated by a water bath, and connected with a regulating water tank, for taking up the excess of heat and hot water.

In the drawing, A represents a tank with entrance and exit pipes, B, for the steam or hot water, and valves, E, for admitting and shutting off the heat. The tank forms the water bath for the pans, C, into which the butter is placed for being softened. The tank is provided with a faucet for drawing off the collecting water, and the pipes, B, are connected with a water tank, D, having a similar discharge faucet. The water tank connecting pipe sections, F, has also valves which may be opened or closed, as required, the water in the tank serving to take up the excess of heat and hot water when the main valves, E, are shut off.

In operation the pans are to be heated to about 70° and the butter is placed therein, the workmen cutting up the rolls with ladles to expose the butter uniformly to the heat.

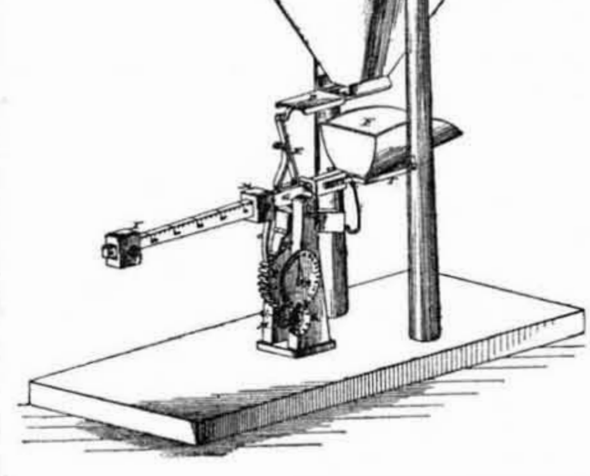


In from twenty to thirty minutes the butter is soft enough to be worked easily by hand with the ladle, the heat of the water bath producing thus about the same effect as the change of temperature from a cold to a warm day. The heat, however, is not sufficient to melt the butter so as to injure the same. Should the bath get too hot, the current of steam or hot water is shut off and conducted into the regulating tank.

Patented through the Scientific American Patent Agency, January 29, 1877, by Warren B. Bemis, of Cincinnati, Ohio.

### IMPROVED GRAIN SCALE.

The annexed engraving represents a new machine for weighing and registering the weight of grain and other articles. A is the hopper or conducting pipe, from which the grain, etc., pass through an aperture in the bottom into the receiving vessel, F, to be weighed. Two rods, B, are fastened to the bottom of the hopper, one on each side of the aperture, for the purpose of connecting the slide, D, with the hopper, and on which the slide moves. C C are two pillars supporting the hopper. D is the slide which closes the aperture in the bottom of the hopper when the receiving vessel discharges its grain, and then returns to its former position, opening said aperture. E is an arm connected firmly to the upper side of the scale beam, G, and over the pivot, and attached to the slide, D, above, so as to govern the movements of the slide in opening and closing the aperture in the hopper. F is the vessel or scoop, resting, by means of the arms, T. on the large end of the scale beam, extending back under the hopper, from which it is filled, and when the weight balances the weight on the other end of the scale beam, it dips and turns on a pivot attached to the ends of the arms, T, and discharges its load. As the other end of the scale beam ascends, the slide, D, is forced back, closing the aperture in the bottom of the hopper, so that no grain escapes while the vessel, F, discharges, after which weight, I, carries the vessel, F, back, withdraws the slide, D, and the vessel is again filled, the grain weighed, discharged, the weight registered, etc. G is the scale beam, H the movable balance, fastened with thumbscrew in the scale beam. O is a ratchet attached to the under side of the scale beam, so that as the beam returns horizontally, after the vessel, F, discharges, it turns the ratchet wheel one ratchet. P is the ratchet wheel between and supported by the pillars, and to



which the registering hand of the dial, R, is attached, and moves as the wheel moves, thus registering the quantity of grain weighed or the number of times the vessel discharges. U is a small cog wheel, arranged so that when the ratchet wheel, P, makes a revolution a small ratchet in the ratchet wheel strikes a cog and turns the wheel, which causes the hand of dial, S, to revolve from figure to figure, thus registering the number of revolutions made by the hand of dial, R, and the aggregate pounds or bushels weighed.

The device was patented February 27, 1877, by Mr. P. H. Cherry, of Parsons, Kansas.

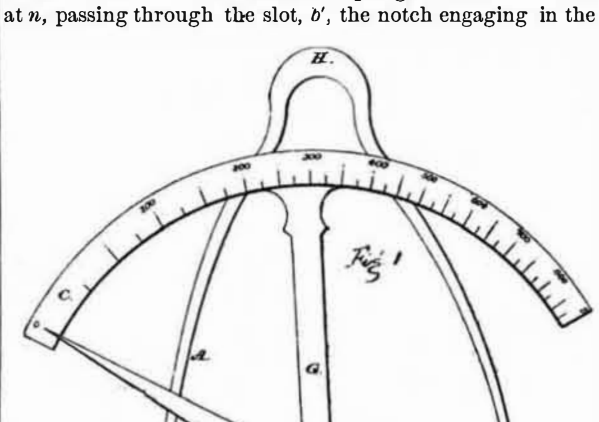
### Cure for Small-pox.

Mr. Edward Hine, in the Liverpool *Mercury*, asserts that the worst case of small-pox can be cured in three days by the use of cream of tartar—an ounce dissolved in a pint of water, to be drank at intervals, when cold. He pronounces it "a certain, never-failing remedy."

### A NEW DYNAMOMETER.

This device consists in the employment of a bent spring, to the lower ends of which the draft connection is attached, and at the lower ends are slots through which pass a bar having one end rigidly secured to the spring, and the other end sliding in a slot in connection with a second notched bar, passing through a slot in the bent spring, the opposite end of the notched bar being pivotally connected with a pointer, which indicates, on a graduated arc, the draught force.

The spring, A, is preferably made of cast steel of suitable length and stiffness, rounded at its upper end to form a loop, H, by means of which it may be attached to the plow clevis, or other implement, the draught power of which is to be tested. Eyes, *e*, in the opposite or front ends of the spring, receive the links, E, and ring, F, forming the draught connection. B is a bar passing through slots, *b b'*, near the outer ends of the springs, one end being rigidly secured by a bolt, or otherwise, to the spring, and the opposite end sliding in the slot, *b'*, in the outer end of the spring. I is a bar notched at *n*, passing through the slot, *b'*, the notch engaging in the



edge of the slot. To the opposite end of the bar, I, is pivoted the pointer, D. G is an arm attached to the bar, B, curved at its upper end, and carrying the indicator, C.

Patented February 6, 1877, by Mr. Jesse Blackinton, of Roscoe, Ill.