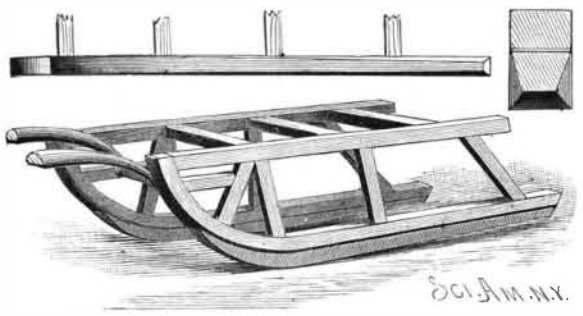
IMPROVED SLEIGH.

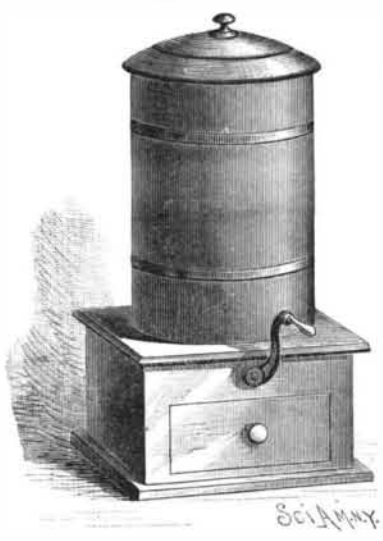
This invention, which has been patented by Mr. Samuel T. Beswick, of Blair, Wis., consists in a diverging construction of the runners relatively to the line of draught. The runners are turned up in front as usual, and are fitted with suitable metal shoes, which are made of tapering width on their bases and with shelving sides throughout the greater portion of their length, being narrowest at their rear ends. The forward portions of the shoes may be made of equal width so that their sides will be parallel with the central line of draught, or the taper may, if desired, extend the whole length of the shoes. In some cases it will be found advantageous to make the base line or surface of the shoe taper upwardly in a backward direction throughout the length of the side taper. This construction of the shoes reduces the friction and allows the rear end of the sleigh to sink somewhat, and so prevent the front end from cutting the snow too deep; the sleigh can also be turned easier, and will keep to the track more readily.



BESWICK'S IMPROVED SLEIGH.

FLOUR CHEST AND SIFTER.

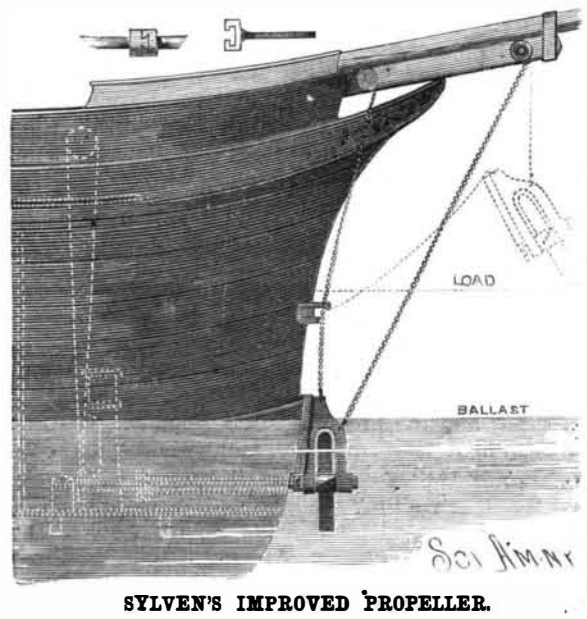
The accompanying engraving represents a flour chest and sifter invented by Mr. H. G. Filson, of New Cumberland, W. Va. Extending across the mouth of a conical hopper secured in the receptacle near the middle is a bar, which supports a central stud carrying a bevel gear wheel formed with two or more arms, and carrying upon its upper surface a sieve, which is near but not in contact with the mouth of the hopper. This gear wheel meshes with a horizontal shaft, one end of which extends through the side of the receptacle and is provided with a crank handle. In the bottom of the receptacle is a drawer, and on the top is fitted a cover. The receptacle is designed to contain a supply of flour. When flour is needed the crank is turned, thereby rotating the sieve and discharging a quantity into the drawer, from which it is taken for use. The cross bar not only serves as a support for the stud, but also as a stirrer for breaking up lumps of flour and causing it to be more rapidly sifted.



IMPROVED PROPELLER.

The propeller herewith illustrated can be attached to either wooden or iron vessels, and is designed as an aid for sailing vessels in a calm. The screw is mounted upon a short shaft, journaled in the lower part of the frame. The inner end of the shaft is formed with a clutch, which connects with a similar clutch on the outer end of a shaft journaled in a bearing in the keel and in a pillow block located within the vessel. At the perpendicular edge of the frame is a T-piece fitting in a flanged guide attached to the keel for holding the propeller in proper position. When not in use, the propeller is carried upon deck, and is raised and lowered by means of two chains arranged as shown in the engraving. A simple device is provided for guiding the T-piece of the frame, so that it will easily enter the guide, while a lip formed at the bottom of the socket prevents the propeller frame from dropping too far. The inner end of the main shaft is provided with a pulley, over which passes a belt leading over a pulley on deck. When the latter is revolved by any suitable hand or other power, the screw is turned to propel the vessel. A stop spring is adapted to spring over the upper end of the T-piece, and lock the propeller in the socket. This spring may be drawn out to release the propeller, by means of a cord reaching to the deck. It will be noticed that when the propeller and its frame are lifted on board, nothing is left in the water to make any resistance or cause fouling.

This invention has been patented by Mr. W. T. Sylven, whose address is care of Messrs. William Cramp & Sons, Beach and Norris Sts., Philadelphia, Pa.



SYLVEN'S IMPROVED PROPELLER.

REVOLVING TARGET.

The revolving target herewith illustrated is the invention of Mr. W. H. Adams, of Fort McIntosh, Laredo, Texas. Framed into the main post, which is mounted upon an upright metal spindle secured to the base of the target, are cross arms of equal length, and the ends of which are slotted to receive the upper and lower horizontal arms of the target frames, to which are secured the plates on which the bull's eye and rings of the target are painted. The revolving portion of the target is locked in place to hold one of the plates in position to receive the shot, by a spring secured upon the base, and provided with a rod by which it may be depressed to disengage the target by a foot bar extending to a shelter behind which the target tender stands. This target is easily constructed and durable, and the frames may be readily removed and replaced when the plates require renewal.

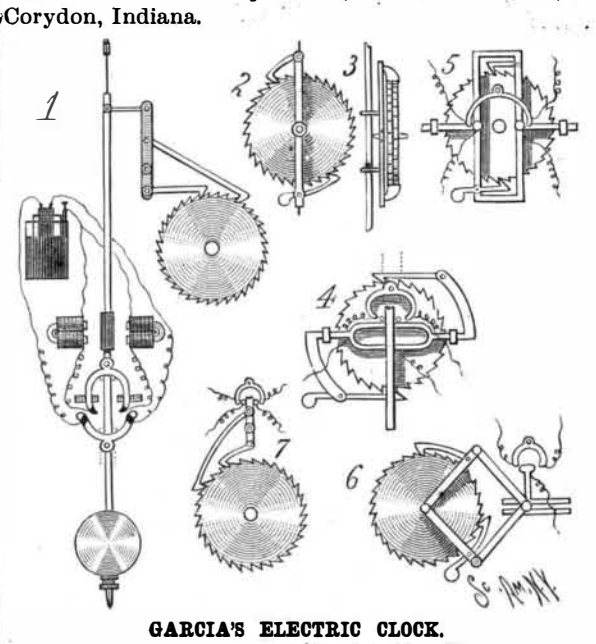
ELECTRIC CLOCK.

The clock herewith illustrated is constructed with two toothed wheels on the same shaft, one wheel having one or more teeth than the other, and both being operated by the same pawls, so that one is moved faster than the other; and by means of hands the relative positions of the wheels and the time are indicated. On the pendulum rod, Fig. 1, is an armature interposed between two electro-magnets connected by wires with one pole of a battery and with contact pieces on the ends of the shanks of a U-shaped anchor pivoted to swing on a suitable fixed support. These contact pieces are interposed between and arranged to be struck by contact plates near the free ends of an inverted anchor, also pivoted on a support, the plates being connected by wires with the other pole of the battery. In the shanks of the upper anchor are adjustable screws, which are alternately struck by the swinging pendulum rod.

With this construction, when the pendulum starts to swing to the left, it strikes the left-hand screw, and throws the corresponding contact piece on the upper anchor against the contact plate on the lower one, thereby closing the circuit through the left-hand magnet, which attracts the armature and gives the pendulum an impulse to the left, accelerating its motion slightly, until the contact piece slides off the plate and on to the non-conducting tip of the lower anchor. The circuit is thus broken and the pendulum allowed to swing by its own gravity to the right, when a similar impulse is imparted to it. The motion of the pendulum is thus maintained constant.

Attached to the upper part of the pendulum is a rod secured to a lever provided with two pawls connected one above and one below its pivot. The motion of the pendulum causes the pawls to engage alternately with the teeth of both wheels, which are thereby revolved. These pawls may be arranged in different ways, as shown in Figs. 2, 4, 5, 6, and 7, Fig. 3 being an edge view of Fig. 2. The pawls act alternately, and each one always acts upon both wheels, so that when one wheel is revolved the other is revolved with it; and as one has less teeth than the other, it is evident that when the larger wheel has completed one revolution, the smaller has made one revolution and a few teeth more. The numbers of the teeth are such that the relative movements of the wheels will take place in times corresponding to the subdivisions of time into hours, minutes, and seconds.

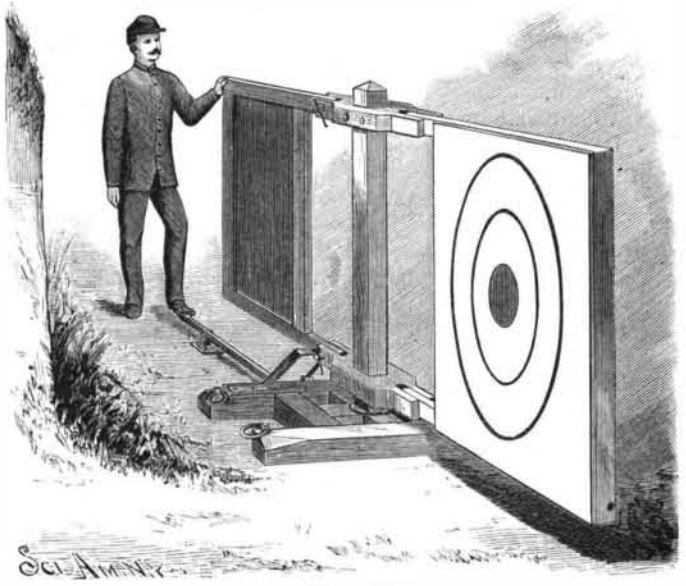
This invention has been patented by Mr. D. T. Garcia; particulars can be obtained from Mr. G. Castanos, of Guadalajara, Mexico.



GARCIA'S ELECTRIC CLOCK.

Dental Caries in Bakers.

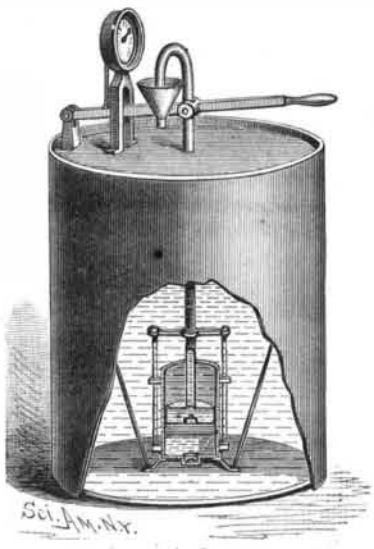
Professor Dr. Hesse, of Leipsic, in the *Deutsche Monatschrift*, points out the deplorable condition of the teeth of bakers, and says that he is often able to tell the profession of the patients by the condition of their teeth. The caries is soft and rapidly progressive. The principal parts attacked are the labial and buccal surfaces of the teeth, commencing at the cervix and rapidly extending to the grinding surface. The approximal surfaces do not seem to be attacked more than in other patients. He believes the disease to be due to the inhalation of flour dust, the caries being caused by the action of an acid which is formed in the presence of fermentable carbohydrates.



ADAMS' REVOLVING TARGET.

MEASURING PUMP.

The measuring pump herewith illustrated will pump one-half a gallon or any desired fraction of that amount at each stroke. The pump is secured at the bottom of the tank by braces, and is provided with a hollow piston head and tube which is connected to the operating lever placed on top of the tank. To this lever is connected, by a rod, a measuring device or register, so that the up and down movement of the lever will move the pointer in front of the graduated dial a distance bearing a certain ratio to the distance of movement of the lever. The dial is graduated in pints, quarts, and gallons, according to the capacity of the pump. The mechanism for operating the pointer is very simple in construction, and reliable. The upper, curved end of the pipe is attached to a funnel for directing the flow of liquid into any receptacle. To draw any desired quantity of liquid, the lever is raised until the pointer indicates the desired quantity on the dial, when the lever is simply forced down, which will cause the exact quantity to be thrown out by the pump.



Further particulars concerning this invention may be obtained from the patentee, Mr. W. B. F. Sims, of Corydon, Indiana.

Slag Cement.

The possibility of using the slag or scoria resulting from the smelting of iron and other metals for the production of cement, is an idea that has presented itself to many inventors, and has engrossed a vast amount of time, hitherto with very little practical result. We read that this subject has attracted the attention of "several cement manufacturers on the Tyne banks," and that experiments are being made "to utilize the residuals from the blast furnaces in making Portland cement of higher quality than that produced by the ordinary process." A short time ago the Middlesbrough ironmasters spent a good deal of money in similar attempts, and before that we were assured that Mr. Ransome had succeeded in turning various descriptions of slag to profitable account in the preparation of cement said to be superior to Portland cement. So far, however, the new cement has made but little impression on the market, and we are almost despairing of its ultimate introduction. To the superficial observer this problem is doubtless an attractive one. Portland cement, even in these days of competition and low prices, is a relatively costly material, and iron slag is a drug upon the market, and a commodity which some people have even to pay to get rid of; and if, indeed, by some simple process we could convert these millions of tons of scoria into cement, not only would the production of iron become cheaper than ever, but the manufacturers of Portland in the ordinary way would have to close their works, while, with cheaper cement, one more excuse for bad mortar and jerry building would be removed.

So far, however, the would-be inventors, though they may have been skillful chemists, have shown themselves singularly unable to deal with the chemical facts involved in the production of Portland cement; and though we have to some extent considered the chemical aspects of this question on previous occasions, it may, perhaps, not be amiss to remind our readers, and those who take an interest in this important subject, of certain facts which militate sadly against the employment of slags for the manufacture of Portland.

The double silicates of lime and alumina, burned to the point of incipient vitrification to form the clinker of Portland cement, vary but little in composition, no doubt, from the fused mass drawn from the blast furnace. Indeed, certain of the "basic slags" resulting from the recently introduced processes of Messrs. Gilchrist and Thomas are, chemically speaking, but little different from Portland clinkers; but, as every practical cement maker is aware, there is all the world between a properly burned clinker and one in which the firing has been pushed too far, and which has become, as the term is, slightly "blued." Very hard burned clinker is a most treacherous and dangerous material; not only does it tear the stones all to pieces to grind it, but it resists the combination with water, and becomes hydrated either very slowly, or, if the clinker was actually fused, not at all, while a very small proportion of overburnt clinker will, if it be not picked out, spoil the contents of an entire kiln. The reason for this clearly is that what we have to prepare is a double silicate, capable of hydration, that is to say, capable, when reduced to a fine powder, of entering freely into combination with and of solidifying a certain proportion of water, and of thus binding together the particles of stone, gravel, sand, etc., with which the cement is employed. When the silicates have been fused, or "dead burned," we get a crude glass, as little capable of becoming hydrated on admixture with water as so much sand would be, or we obtain, perchance, a large proportion of these inert silicates, mixed with a quantity of feebly hydraulic silicates of a most dangerous and unreliable character, some of which will inevitably "blow" in the work, *i. e.*, combine with water only after the surrounding particles have set, and have become more or less indurated.

It is, of course, well known that molten slag, when run into water, is mechanically reduced to a very fine state of subdivision, and the silicious particles thereby produced have long been used in place of sand. Some slags, also, when exposed to the action of the atmosphere, will "weather" or crumble, owing to some slow decomposition of the silicates, and to the presence of iron in small quantities. We have yet to learn that the decomposition of slag could be at once effected by any chemical means, which should, as is stated in the article from which we quote, "reduce it to its elements of silica, lime, and alumina" in an uncombined form. Such a chemical discovery would indeed be one of marvelous significance. Many years ago, while this plan of making Portland cement from slag was unthought of, it was proposed to add to molten slag an excess of slaked lime, in the belief that it might be possible in this way to produce hydraulic limes at a cheap rate; but the difficulties of introducing the lime, and of causing it to become thoroughly and intimately mixed with the slag, were found to be insuperable, and the silicates produced were, even with a large excess of lime, extremely insoluble.

Strangely enough, though the ordinary varieties of slag are so inert in themselves, they have some of them the power of rendering hydraulic substances, with which they are suitably mixed, even more hydraulic, and of stimulating in this way chemical action; and it has been proved by Dr. Michaelis that it is possible to improve a good sample of Portland cement by adulterating it with a small proportion of crushed slag. That this action is not simply a mechanical one is proved from the fact that other inert substances have not a similar effect, and it is contended, therefore, by a certain section of the authorities in Germany that an adulteration which tends to improve the compound is not an adulteration, and that the addition of slag to Portland cement should be permitted. This manner of employing blast furnace slag is, of course, wholly different to that contemplated by the Newcastle cement makers, but it is worthy of consideration by those who have undertaken the experiments on the Tyne.

The question of the preparation of cement from slags turns upon the solubility or otherwise of the silicates. An insoluble silicate is manifestly incapable of being rapidly acted upon by water, and of undergoing any such rearrangement of its particles as takes place during the "set" or hydration of a sample of Portland cement. The German gentleman who has proposed to reduce slag into its elements must also undertake to recombine the silicic acid with the lime and alumina in a form capable of gelatinizing when treated with acid, and this, we fear, he will fail to do without exposing them to a good red heat—a costly matter to obtain, as the cement maker full well knows. The saving to be effected by the use of the new process would in this event be that only of the cost of the raw materials, less the expense of reducing slag into its elements (which surely cannot be done for nothing), and in this case the cement makers elsewhere need not alarm themselves. If, on the other hand, the German patentee has discovered a means of detrifying slag, and of giving us a compound which requires no firing and which grinds itself, and all this as a sort of supplement to the reduction of the aforesaid molten slag into its elements, we can only say that his invention is one of the most wonderful we have ever even dreamed of.—*G. R. R., Building News.*

The Charleston Earthquake.

The earthquake which visited the eastern part of North America on August 31 was one of the most remarkable in our history, both in its extent and in its serious results to the southeastern portion of the country. Its occurrence naturally excites inquiry as to the possibility of our being more frequently visited than heretofore by this scourge. The numerous earth trembles common to all countries are of little moment, but against such destruction as has visited Charleston we must, if possible, provide.

It is well known that there are lines of abrupt change of the geological structure of the earth's crust, which are known as faults. These are more or less elongated fractures, on one side of which the strata occupy a much higher position than they do on the other. The depressed side may not receive deposits of much thickness subsequent to the fracture. If in this case the elevated side is not removed by erosion, a range of monoclinal mountains is the result. If, on the other hand, deposits are laid down on the depressed area, and the elevated tract is mowed down by "frost and fire," the mountain range disappears, and none but the geologist can detect the fault or fissure.

The shrinkage of the earth is supposed to have been the cause of the elevation of many mountain ranges, which are wrinkles, of the surface. In the formation of these wrinkles, faults often occur. In the formation of the greatest changes of surface, they are nearly always produced. Such abrupt changes of structure occur at or near the sea borders of most continents. The depressed region is occupied by the sea and by the deposited material which flows into it from the shore.

Such a line of fault extends throughout the Eastern United States. It commences at the sea coast of Staten Island, and extends southwest to Trenton, Philadelphia, Wilmington, Del., Baltimore, Washington, Richmond, Raleigh, Columbia, S. C., etc. This is a very important line in the economy of the country. Here the hill country ceases and the plain of the seaboard begins. In many of the States it marks the head of tidewater and of navigation. It is here that the most important cities of our Atlantic States have been built. The presence of water power or of tidewater, or the conjunction of both, has determined their location. Other conveniences make them desirable dwelling places. Such is the equal accessibility of the fruit and vegetable products of the plains with the grazing and dairy products of the hills. Such the equal accessibility of sea shore and elevated places of summer resort. Professor Cope pointed out this interesting geological position of our Eastern cities several years ago.

The position has, however, the disadvantage of being on the line of fracture of the border of the continent. This line is the hinge on which the flatter region of the coast has in past geological ages moved up and down. Many times this region has been submerged, and as many times it has been elevated above the sea level. More than half of it in the latitude of New Jersey, that is, a width of one hundred miles, is submerged at the present time. Its sea border from New Jersey to Florida has been slowly creeping westward, since observations began to be made on our coast. The most exact of these observations have been made by Professor George H. Cook, on the coast of New Jersey. Geologists know that the present state of affairs is not a permanent one. There is no reason to doubt but that the line of fracture referred to may not again become the coast line, or, on the other hand, that the width of our coast region may not be extended one hundred miles out to sea. The plains of this region will then be submerged or elevated. In the former case, if the process be rapid, the loss of life will be great. But it will probably be slow, with occasional slips of one side of the old faults on the other, which will jar the rocks over large areas. Under these circumstances there is no reason to suppose that our region can continue to be exempt from earthquakes. We are to expect periods of repose alternating with periods of disturbance.—*American Naturalist.*

Annual Fair of the American Institute, New York.

Although this exhibition has now been open about six weeks, the crowds in attendance every afternoon and evening show no diminution. Those who have been frequent visitors to the fair in former years generally want to go at least once with each recurring season, while strangers never fail to find much that is entertaining and instructive. The silk loom is this year weaving handkerchiefs on which the New York and Brooklyn Bridge is represented, and they are very much sought after by out of town visitors. The ice-making machines, with their frost-covered pipes, look refreshingly cool, and a large proportion of the passers-by are constantly putting their hands on the icy conductors to satisfy themselves that the ice is real; printing presses are at work on large sheets of advertisements; the workman who is moulding clay into vases, jugs, bowls, and all sorts of pottery has an interested crowd at all times around him; near the man who is noisily selling the potato parer are two Stiles & Parker presses at work stamping out of sheet metal the knives for making the parers. In the woodworking department tobacco boxes are being made, and a great variety of fancy wood articles; sewing machines and attachments fill a considerable space, and the work of fancy stitching and embroidering is practically illustrated by deft manipulators of the various improved devices represented; diamond cutting, as practically shown, always has a crowd of curious onlookers, and the exhibitors of power hammers, stone breakers, and other noisy machinery are frequently starting up their appliances as the crowd happens to gravitate in their neighborhood. There is a full exhibit of the Pierce well drilling machines, the Delamater small pumps and engines, and the New York trade schools of Mr. Auchmuty show some very creditable work in plumbing, wood carving, and carpentry executed by the students. Among the most noteworthy of the exhibits is that of the Ball Electric Light Company. The Ball dynamo has two armatures, each of which rotates within the inductive influence of only one pole of a field magnet, and it has made a wonderfully good record within the four years since its introduction. Mr. Charles Wager Hull, the general manager of the exhibition, has now had so many years' experience in the conduct of these fairs that everything connected therewith proceeds with almost the regularity of an established business, to the satisfaction alike of exhibitors and the public.

The New Eight-Inch Thirteen-Ton Gun.

The Ordnance Department is much pleased—the *Army and Navy Register* says—with the performance of the new 8 inch steel gun at Sandy Hook. "This gun, which weighs 13 tons, and whose length of bore is 30 calibers, was manufactured at the West Point Foundry. The tube and jacket were obtained from Whitworth, and the hoops and the breech mechanism forgings from the Midvale Steel Company. The gun was first tried with the German brown prismatic powder, when the following results were reached: With a charge of 100 pounds, and with a shot weighing 182 pounds, the muzzle velocity was 2,145 feet, and the pressure 29,500 pounds; with a 235 pound shot the velocity was 1,942 feet, and the pressure 32,250 pounds; with a shot weighing 286 pounds the velocity was 1,795 feet, and the pressure 32,800 pounds. The gun was next tried with Du Pont's brown prismatic powder, the charge being the same. The velocity with a 235 pound shot was 1,937 feet, and the pressure 32,950 pounds; with a 286 pound shot the velocity was 1,820 feet, and the pressure 35,450 pounds. The gun has been fired thirteen times, and will now be turned over to the testing board. It is worthy of remark that when this gun was designed, the computed velocity with the 286 pound shot was 1,825 feet, and the computed pressure 36,000 pounds. This is almost exactly verified by the firing with the Du Pont powder."