

boys and girls, of the workmen at this immense establishment, are educated and trained in schools organized by M. Schneider. So far from the education which they receive putting the workman above his work, the contrary is the case; it enables him to do it more to the satisfaction of his employer, and to his own honor, and better for his own personal advancement.

The system of the instruction given at the Creusot schools is fully detailed in tables hanging on the walls of the Great Exhibition; drawings of the habitations of the workmen, their churches, their hospitals, and their schools, are also exhibited.

"Statistical tables illustrate the progress and changes of the population; these are divided into two parts—the one showing the progress of their material welfare, their accumulation of property, and their consumption of food and luxuries; the other showing the amount of attendance at schools, the relative statistics of individual success in these schools, and the subsequent rank attained by each pupil in the manufactories. From these we gather that the progress of education has always been followed by improved moral character and advanced social being; that the pupils who have most successfully availed themselves of the technical schools are those who have afterward risen to the highest ranks as foremen, clerks, superintendents, overseers and engineers, in the works themselves."

These tables also show "the organization of the schools, the programme of subjects taught, distribution of pupils' time, samples of their mechanical and mathematical drawings, samples of their hand and eye sketches, examples of writing and French composition, lists of their studies in religion, sacred history, French history and geography; studies in arithmetic, algebra, elementary geometry, and descriptive geometry; specimens of ornamental writing and map drawing. These are for the boys. But the girls also are well educated, with the difference that for plain drawing and geometry are substituted needle-work and dress-making. They are also taught book-keeping." It was remarked this education—fully equal to that taught in most of our high schools—does not put the workman above his work; and the magnificent display in almost any branch of heavy iron and steel manufacture placed by the Creusot works in the Exhibition, is as finely finished, both as regards accuracy and beauty of finish, as it is possible to make iron and steel. Fully equal to that of the most ignorant and dextrous of the English workmen.

It has been intimated on more than one occasion, by a prominent political economist of this country, that it would not harmonize with the "American idea" for employers to manifest any interest in the welfare and advancement of their employes. We believe this to be ridiculous fallacy.

No doubt American mechanics will strongly object to be ostentatiously patronized by that spirit of vanity which is so often illustrated in founding educational and theological establishments, so as to afford a prominent place to display the name of the founder. But an employer who cannot manifest an interest in the welfare of those employed by him, and those depending on them, without offending that proper pride which belongs to any man who is good for anything, by ostentatiously patting them on the back, and doing good with a loud blowing of horns, shows at once that he is a mean fellow—even more stingy, in reality, than one who makes no pretensions.

The moment a man becomes an employer he assumes duties which it is wicked to shrink from; duties scarcely less sacred than those due from parents to children. It is quite unnecessary to enlarge on these obligations, any one who cannot hide behind a three cent piece will appreciate them just as thoroughly as though they were placed before him in the largest type.

Where you find a man with a keen scent for gratitude, it is a pretty safe rule to set him down as "small potatoes, and few in a hill." To do good, to advance the welfare of others, to add to their happiness, is all the reward a noble nature cares for; and this seems to be the spirit which moves the manager of the Creusot Works.

If one cannot attempt to add to the means of enjoyment of others, without the accompaniment of a brass band, he had better, a good deal, not make the attempt at all.

#### THE TWENTY-EIGHTH STREET BOILER EXPLOSION.

This catastrophe which occurred Sept. 9th was so remarkable that it has attracted the attention of engineers and practical men throughout the country. The public, generally, have also read the details with great interest. The statements, however, which have appeared in some of the news journals have been so inaccurate and confused that we deem it well to publish the facts as they could be ascertained by personal inspection. This boiler, which was eight feet diameter at the bottom, six feet at the top, and fourteen feet and six inches high, and weighing five tons, exploded about 4 P. M. on the 9th of September, at 258 West 28th street, ascending into the air nearly vertically, with a slight westerly inclination, described by those who saw it as appearing about the size of a nail keg, and falling into the rear part of the dwelling house 308 West 28th street, a distance horizontally of about 450 feet. Two persons were killed where the explosion occurred—the engineer and fireman; and two children of Mr. Houseman, by its descent through his dwelling, and several others were injured.

This boiler was new, having been in use less than two months and a half, was built by Densmore & Black, of this city, and was of the style known as the Densmore boiler, which has an excellent reputation in different parts of the country. It was illustrated and described on the first page

of No. 23, Vol. XVI. SCIENTIFIC AMERICAN. It was tested by hydrostatic pressure to 115 pounds to the square inch. The iron is pronounced of good quality by all practical iron men. The man who has since bought it and cut it up, says it is the best iron he ever found in a boiler. All agree that the boiler was well made. These boilers, of the same size as this, have been tested both by the Metropolitan police inspectors and the steamboat inspectors, to 120 pounds to the square inch, and received their certificate to carry 80 pounds pressure of steam, and have carried that pressure for years. Many of them are now running, carrying 90 and 100 pounds to the square inch.

It was intended to carry 60 pounds pressure to the square inch on this boiler, and the safety valve was supposed to be set to blow off freely at that pressure. It had two steam gages—one in the fire room and one in the engine room. It did its work very easily, running all the time with the damper nearly closed and much of the time with the fire door open. On the afternoon of the explosion it was not doing more than about half its ordinary work. The engine was running at the time of the explosion and had not been stopped. The boiler had never been known to foam any after the first two days, and it was working to the delight and admiration of the owner and scores of practical steam men who visited it.

The lower portion of the boiler stood in a vault, the arch over the vault coming up a little below midway of the boiler, there being about two inches space between the boiler and arch all around. The fire room was below the arch, and the engine room was above and at one end of it, and the gage cocks and water glass gage were above the arch on the back side of the boiler where the fireman could not see them when at his duties, it being intended that the engineer should have sole charge of the water. This was an arrangement of the engineer himself. It should be borne in mind that the same engineer and fireman had run there, for about four years, three horizontal boilers placed in this vault—the fireman having charge of the fire and water, and the engineer charge of the engine and the machinery generally through the establishment. The boiler stood upon cast-iron legs that raised the bottom of it sixteen inches from the fire-room floor, which space was open on the front side half way around the boiler and stopped up on the rear side with a four inch brick wall laid up under the edge of the boiler. The fire grates were about 20 inches above the floor of the fire room, and the fire-box in the boiler was about 7 feet 4 inches high above the grate and contained about 180 square feet of heating surface of the most effective kind, the heat acting with nearly equal force upon every part of it. From the top of the fire-box the heat was conducted down to the bottom of the boiler through 135 tubes, 6 feet long and 2½ inches outside diameter, and was conducted directly from the bottom of the boiler to the chimney, and the outside of the boiler was covered with hair felt all over to the very bottom.

The cylinder containing the tubes was 4 feet diameter and 6 feet long, hence would contain, without any tubes, 90 cubic feet of water. The tubes would displace 27½ cubic feet, leaving the water contents of the tube cylinder 62½ cubic feet, or more than two thirds as much as it would be if it had no tubes in it. The water spaces between the tubes and the shell would average about six inches thick. The water spaces around the fire-box were nowhere less than four inches thick, and would average full six inches and a half thick. The gage cocks were set to carry from fifteen to twenty inches depth of water on the crown sheet. In regular working order it carried over 1,300 gallons of water, or about 21 hogheads, about one cubic foot to every four feet and a half of heating surface. The ordinary run of stationary tubular boilers carry one cubic foot of water to from five and a half to seven square feet of heating surface; railroad locomotive boilers, a cubic foot of water to from eight to eleven feet of heating surface; and steam fire engines a cubic foot of water to from thirty to thirty-two feet of heating surface.

The evaporating power of this boiler, as near as we can arrive at it, was about 470 gallons per hour. The quantity of water on the crown sheet about 315 gallons, as designed to be worked, hence it would take forty minutes to uncover the crown sheet, and about twenty minutes more to get the water down to the upper tube head, which would have to occur before the tubes could heat.

The upper ends of the tubes and all the upper portion of the fire box showed unmistakable evidence of having been over-heated. The lower tube head blew out taking the tubes with it, the head and most of the tubes remaining where the boiler stood, the tubes first coming out of the upper head. There were 135 two-and-a-half-inch tubes equally distributed over a fifty-two-inch head well expanded with good projections on each end outside of the heads, and if not over-heated would not have yielded at three times the pressure that other portions of the boiler was able to withstand.

#### THE MACHINIST'S APPRENTICE.

Several communications asking information in regard to the trade of the machinist have been received. If we reply to one the answer will comprehend the inquiries of the others.

A correspondent from Iowa wishes to enter as an apprentice, a shop where locomotive and other engines, and machinist's tools are manufactured, or, at least, where engines are built, and desires replies to the following questions: "Can you recommend some such establishment where I could get in or you think I could? What is the period and what the terms of an apprenticeship? I wish a situation where the best of work is done and an opportunity is afforded the apprentice of becoming a thorough workman."

The time was—twenty-five or thirty years ago—when the position of apprentice to the machinist trade was easily ob-

tainable and the remuneration was sufficient to support the apprentice. It is not so now. To enter a good shop as an apprentice requires in most cases influence and the position is granted as a favor. The amount paid is rarely more than enough to liquidate board bills, if it is even so much, and the time required from three to five years. There are adequate reasons for this change. The apprentice must be furnished with good and valuable tools and his work is of as high a character as his increasing capabilities will warrant, not only for the purpose of advancing his interests but for the benefit of his employer. It is not surprising, therefore, that the first year or so of his apprenticeship proves, from breaking of tools and spoiling of jobs, unprofitable to the proprietor.

Again, there is no adequate means to compel an apprentice to fulfill his contract with his employer. He may, soon as he deems himself competent to do work which brings higher pay, leave his shop and go elsewhere. Consequently, master machinists prefer to employ ordinary laborers for their rougher work and journeymen for the better quality. Under these circumstances we do not know how to advise you.

## OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING OCTOBER 1, 1867.

Reported Officially for the Scientific American

PATENTS ARE GRANTED FOR SEVENTEEN YEARS the following being a schedule of fees:—

On filing each caveat.....	\$10
On filing each application for a Patent, except for a design.....	\$15
On issuing each original Patent.....	\$30
On appeal to Commissioner of Patents.....	\$20
On application for Reissue.....	\$30
On application for Extension of Patent.....	\$50
On granting the Extension.....	\$50
On filing a Discontinuance.....	\$10
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

69,298.—FOOT REST.—Calvin Adams, Pittsburgh, Pa. I claim constructing a foot rest with the base, A, of suitable diameter for its support, and thereof, B, of convenient shape to form a rest for the foot, connected by one or more columns, C, C, substantially as shown and described.

69,299.—FENCE.—G. W. Adams, Rochester, N. Y. I claim the arrangement of the metallic stakes, P, double bracing wire, F, in connection with the bed plate, C, and the rails, R, of the fence, substantially in the manner herein shown and described and for the purposes set forth.

69,300.—BROOM HEAD.—E. A. Alexander and H. C. Kellogg, Independence, Iowa. I claim the employment of slotted bar, b, when arranged in combination with hooks, d, d, loop, c, and handle or screw rod, a, in the manner and for the purpose set forth.

69,301.—CORN PLANTER.—Thomas Allen, Arrow Rock, Mo., assignor to himself, Joseph Nicholson, Arrow Rock, and A. B. Garrison, St. Louis, Mo. I claim the arrangement of the furrow plow, B, covers, k, k, side boards, O O, rolling wheel, D, slide valve, v, worked with a lever, E, or automatically, the adjustable cams or pins, p, on the rolling wheel, all in combination, when constructed and arranged substantially as shown and specified.

69,302.—CLOTHES DRYER.—Israel B. Arnold (assignor to C. P. Dunham), Providence, R. I. I claim the improved folding clothes-dryer, as composed of a central post, A, the series of posts, B B B, their several connection bars, C C C, the catch plates, D, and screws, e, arranged and applied together substantially in manner and so as to operate as set forth.

69,303.—MACHINE FOR MAKING SOCKETED REED PLATES.—Chas. Austin, Concord, N. H. I claim the combination as well as the arrangement of the guides, D1 D1, the endless carrier, B, the presser, I, the rotary cutter, F, the vibratory frame, G, and the adjustable cam, H, as described, the said cutter, F, carrier, B, and cam, H, being provided with mechanism for operating them, substantially as described.

I also claim the combination as well as the arrangement of the hopper, E, the guides, D1 D1, the endless carrier, B, the presser, I, the rotary cutter, F, the vibratory frame, G, and the adjustable cam, H, as described, they being provided with mechanism for operating the carrier, B, the cutter, and the cam, as explained.

I also claim the adjustable cam, H, made substantially as described. I also claim the combination as well as the arrangement of two or any other suitable number of edge cutters, L L, and one or more pressers, I K, with the endless carrier, B, the guides, D1 D1, the rotary cutter, F, the vibratory frame, G, and the adjustable cam, H, of the same and the hopper, E, the whole being provided with mechanism for operating the carrier, the cutter, and the cam, substantially as herein before explained.

I also claim the combination as well as the arrangement of the two endless carriers, B M, one or more side trimmers or plane irons, U, the guides, D1 D1, the reverser, S, the cutter, F, the vibratory frame, G, and the adjustable cam, H, the carriers, cutter, and cam being provided with operative mechanism, substantially as described.

I also claim the combination as well as the arrangement of one or more smoothers, V, one or more finishers, W, the plane iron, U, the reverser, S, the endless carriers, B M, the guides, D1 D1, the rotary cutter, F, the vibratory frame, G, and the adjustable cam, H, the whole being provided with mechanism for operating the carriers, the cutter, and cam, substantially as described.

I also claim the combination as well as the arrangement of the hopper, E, the guides, D1 D1, the carrier, B, one or more pressers, I K, the rotary cutter, F, the vibratory frame, G, the edge cutters, L L, the reverser, S, the guides, R R, the carrier, M, the face cutter, U, or the latter and the presser, V, also, their combination as well as their arrangement with one or more smoothers, V, or one or more finishers, W, the carriers and cam and rotary cutter being provided with mechanism for operating them, substantially as herein before explained.

69,304.—WARDROBE BEDSTEAD.—William R. Bagnall, Chelsea, Mass. I claim a hinged oblong bed-frame arranged to swing laterally from a case, and for the purpose described. I claim a swinging bed frame, combined with a surmounted wardrobe or bureau, or both, substantially as described. I claim a wardrobe or bureau, or both combined with a swinging bed frame having head and foot pieces swinging inwards, as and for the purpose described.

69,305.—CARRIAGE-SHAFT COUPLING.—Jesse P. Barrick, Massillon, Ohio. I claim the pivoted or hinged stop, J, and spring, I, arranged in relation to the coupling, in the manner and for the purpose substantially as set forth.

69,306.—CARRIAGE BUTTON.—W. P. Bateman (assignor to himself and N. F. Mathewson), Barrington, R. I. I claim a carriage button, as constructed with the head eccentric to the body, and with a journal to project from the head, and with a screw and a prismatic base to its body, as described. I also claim the carriage button, as not only made with the head eccentric to the body, and applied thereto by means of a journal so as to be capable of being revolved relatively to it as specified, but as having a prismatic base, and a screw to project therefrom, as explained.

69,307.—MACHINE FOR MAKING WAGON WHEELS.—Alonzo Beswick, Paris Richardson, Jr., and John W. Brown, Kelley, Ill. We claim the combination and arrangement of the cross bar, C, and movable bar, E, with the guide bars, H, H, operating in the manner and for the purposes set forth. We also claim the auger frame, W, in combination with the screw, M, and guide bar, H, operating substantially as described and for the purposes stated.

69,308.—BRICK MACHINE.—Peter E. Bland, St. Louis, Mo. I claim the combination of movable platens or followers, b, in a mold-bearing cylinder, B, revolving about a fixed central shaft, H, with one or more fixed cams, k, upon said shaft, all substantially in the manner and for the purpose herein set forth.

2d. The combination of compressing plates, or plungers, G, with a revolving mold-bearing cylinder, B, when said compressing plungers have the within-described reciprocating movements, and operate in unison with an intermittent movement of said cylinder, substantially as and for the purpose herein set forth.

3d. The combination of platens, g, or their equivalents, with a revolving mold-bearing cylinder, B, and radial cam-actuated followers, b, in the molds thereof, when said pistons, g, have substantially the within-described reciprocating movements, for the purpose herein specified.