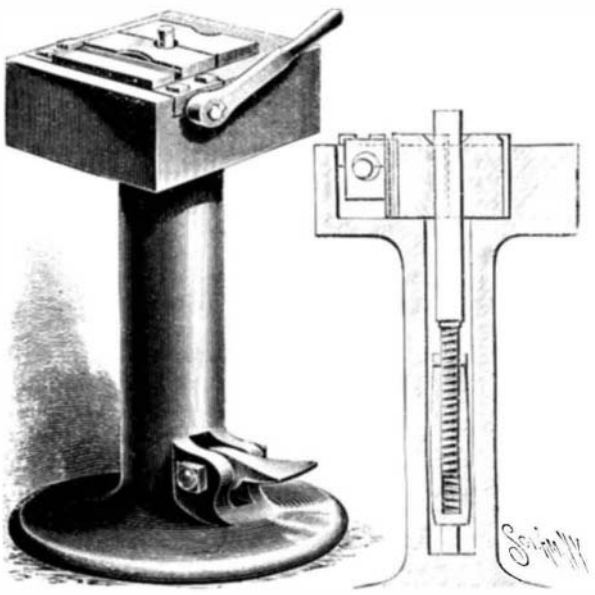
AN IMPROVED BOLT HEADING MACHINE.

The needs of blacksmiths and carriage-smiths have been especially considered in the construction of the simple and durable bolt-heading machine shown in the accompanying illustration, although it is equally applicable for any service where it is desired to head bolts rapidly and nicely. It has been patented by Mr. William H. Betts, of No. 134 Dykeman Street, Brooklyn, N. Y. A box at the upper end of the hollow column, as seen in the sectional view, contains the bolt-holding dies, preferably of steel, and having on opposite sides grooves terminating at one end in a square shoulder and at the opposite end in recesses, so that they are adapted to form either a flat head or a



BETTS' BOLT HEADING MACHINE.

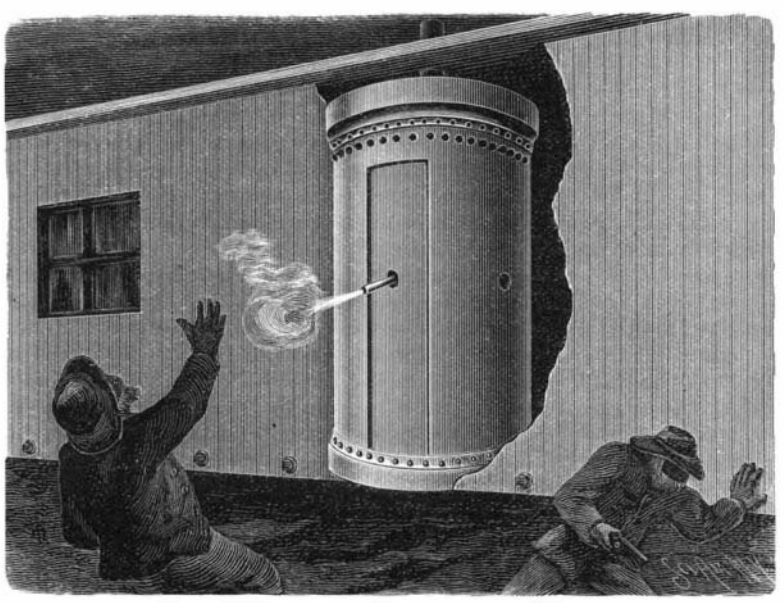
head to fit a countersunk hole. These dies serve as an anvil, and when the bolt projecting through them has its head formed, the end of the bolt is hammered down upon the upper faces of the dies. The bolt extends down and rests upon the head of an ejecting plunger, adjustable to fit bolts of different lengths, the lower end of the plunger resting upon the inner end of a treadle lever. Within the box, at one side of the dies, is a binding block mounted on a cam shaft having a hand lever, by which the shaft may be turned to force the block against the dies to hold them firmly in place. The treadle mechanism is necessary, as the bolt when inserted hot between the dies is inclined to stick.

Tin Salt in Gingerbread.

The attention of the Minister of the Interior has recently been called to the considerable amount of protochloride of tin now used by manufacturers in making gingerbread, the consumption of which in France is considerable. It appears that by the use of this chemical common meal and other ingredients may be used, while the gingerbread will still have the appearance of being of excellent quality. This adulteration has only been going on for some twelve months, but has rapidly developed. The proportion of protochloride of tin used is by no means insignificant. It varies from 500 grammes to 5 kilos. of tin salt to 100 kilos. of flour, producing 200 kilos. of gingerbread. Experiments have shown the chemical in question to be very poisonous. At the last meeting of the Council of Public Hygiene M. A. Riche presented a report of analyses made at the Paris Municipal Laboratory, the most adulterated sample of the bread in question containing 1 per cent of tin. Even if the addition of tin were innocuous, he said he would strongly recommend its prohibition, because it allowed inferior substances to be used in preparing an article of food which is principally consumed by children. M. Riche drew attention to a case of poisoning near Rouen, reported by Dr. Guersant. A servant had carelessly put some chloride of tin in soup instead of ordinary salt. The disagreeable taste prevented some of the family from eating the soup, but those who took only a small quantity showed distinct evidence of poisoning.

A REVOLVING SHIELD FOR CARS.

A metallic turret or shield designed for use in banks, express cars, or any other place liable to attack by robbers or highwaymen, is shown in the accompanying illustration, and has been patented by Mr. John E. Shanafelt, of Lawrence, Kansas. The turret is closed at the top and bottom, and has a door which slides in horizontal ways on its interior. The door and the sides of the turret have sight holes through which a person inside may fire upon an approaching enemy, the sight holes each having vertically sliding blinds which can be opened or closed at will. The top of the turret has a central ventilating draught opening, in which is a tubular journal projecting through the car roof, facilitating the revolving of the turret, which is pivoted centrally upon a stud or pin at the bottom. The mechanism for revolving the turret consists of a gear wheel, with an operating handle, meshing with a toothed wheel, both wheels being mounted upon a framework within the turret, and the toothed wheel extending through a slot in the turret bottom, where it engages a circular rack bar in the floor of the car or room where the turret is set up. Caster rollers may, if desired, be attached to the bottom of the turret as an additional support and to facilitate its turning, or the shield may be built in the corner of a room, to be stationary, and of such shape as may be best fitted for different situations. The construction occupies no more space than an ordinary heating stove, is comparatively inexpensive, and is designed to be readily accessible to an express messenger or other person in charge of valuables in time of danger.



SHANAFELT'S REVOLVING SHIELD FOR CARS.

THE FAMINE IN INDIA.

FRANK VAN ALLEN, MEDICAL MISSIONARY TO MADURA, SOUTH INDIA.

The attention of the whole world is directed to the terrible famine in Russia, consequently it is not generally known that a similar scourge is afflicting India. In this country all the horrors which follow in the wake of starvation occur with fearful regularity every fifteen years, or twice in every generation. The last great famine was in 1876, and it was estimated by the government that 5,000,000 (five million) persons died of starvation and the two diseases that go with it—dysentery and famine fever.

The cycle is completed again. Owing to a partial failure of rains, the fearful calamity of another famine was threatened a year ago. This year the rains have entirely failed; however, the famine is not yet at its height, for there are districts here and there where a slender harvest is possible, which for a few weeks will ameliorate the condition of the people who live in these favored parts. When this small supply of grain is exhausted, the famine, which is already very serious, will grip the whole nation in its withering hand, and there is no hope or help from within their borders until the next rains, nearly a year hence.

No one who has not seen and felt the awful desolation can realize into what a fearful condition a country is plunged by famine. No rain, crops scorched by the intense heat; tanks, whose supply of water has been depended upon for irrigation, empty, and their beds baking in the blazing sun; all vegetation withered, and rivers and wells dry; the scarcity of food increasing, the price of grains rapidly rising; the people, with their gaunt, emaciated bodies, flocking by the hundreds and thousands to the relief camps established by the British government. All this misery and suffering because the blessed rain has been withheld. In many places fodder for cattle is unattainable, and the people are tearing thatches from buildings to feed the famishing animals. In other localities cattle are being killed in great numbers, as their owners are unable to feed them. Also thousands and thousands have died and are dying of starvation. Every effort is made to keep a certain number alive, which must be done at all hazards, for plowing when the next seeding time comes.

How the people are to maintain themselves until the next annual rains is a most serious question, and will doubtless be answered in the usual way—a large part of the population will be supported by the government at the famine camps. There will be a bare existence of many others, and the death of thousands and even millions of people. The better class will have enough to eat, as they will import grain at enormous prices from other countries.

But the matter of food is not the only problem connected with existence. The question of water becomes a pressing one, and is more serious from the wretched religious caste customs; a high-caste man will not drink from a well if a low-caste man has lowered his water pail into it, and so defiled its contents. This really affects the low-caste man, because he is driven away and not allowed to come near these wells, and his own being more shallow have become dry. In this emergency the government comes forward, and as a part of the relief work offers to loan money for the digging of wells. The people avail themselves of this offer, and just now there are being dug in one presidency upward of 19,000 (nineteen thousand) wells from loans so made by government. This money is loaned on thirty years' time, with interest at three per cent per annum, and often without sufficient security, but is done to relieve the distress of this ill-fated nation.

With all that the English government are doing to alleviate the horrors of the famine, there is much unnecessary suffering, which arises from the peculiarities of the people, particularly the higher castes. For a caste man to eat or drink anything which has been touched by one not of his caste is so degrading that he would rather suffer death. This is a religious matter with him, and there

THE FAMINE IN INDIA—REFUGEES IN A GOVERNMENT CAMP.

is no doubt but multitudes die because they will not accept food at government relief camps or famine kitchens. Many others of not so high caste hold out for a while, then come and partake of the wholesome food. This is too much for their weakened condition, their stomachs refuse to digest it, dysentery results, and in a few days they die.

The one disease accompanying a famine and causing more deaths than either dysentery or actual starvation is famine fever. It is a late attendant, appearing when the people are emaciated and weak, and for it there is no remedy, and the other remedies have no effect on it. When once begun, it becomes widespread. The weak and ill-nourished who have resisted other influences, and but for this might have lived until the next rains, fall easy victims. It is during this period that deaths are so numerous. The dead lie by the roadside in great numbers; the dying crawl off into the jungles and are eaten by wild animals.

All that a government could do for a famine-stricken country, the English government does for India at these sore times, and deserves much praise for the energetic measures taken. Leave on furlough to all officers of government is forbidden. Those absent on leave are summoned; relief works are begun. These consist of building new roads, canals, etc., and are designed to help those who are able to work. During a famine many such public improvements are constructed which the government would not otherwise afford. For those who are not able to work by reason of their reduced strength, debility, or age, a form of relief is established known as the famine kitchens. There meals are cooked and given away to all who come. For those who are unable to walk, camps are provided; they are generally located near a kitchen, and are a refuge for thousands. These relief works, famine camps and kitchens are to be found every few miles all over India while a famine lasts. But although the government deals thus energetically with the problem, and grants every alleviation in its power for the distressed country, the suffering and loss of life is extreme.

STEVENS INSTITUTE OF TECHNOLOGY.

If any one should turn back to the volumes of the SCIENTIFIC AMERICAN, between 1871 and 1873, they would find various notices of the Stevens Institute of Technology, then being established in Hoboken, N. J., in which we took a lively interest as being the first institution devoted exclusively to the training of mechanical engineers in this country, and we may indeed say in the world, if we take account of the special combination of theory and practice involved in its course of instruction; because in no school before had there been any such combination of the theoretical development of the science of mechanical engineering on a mathematical basis with the practice of the same science as carried out in the foundries and workshops.

We naturally looked upon the experiment then and there inaugurated with the deepest interest and most cordial sympathy, because we saw how important to the prosperity of those mechanical industries on which our national prosperity rests would be the success of this undertaking, which aimed at nothing less than the education of young men in a way that would fit them to go into the workshops of the country and supply the much needed theoretical knowledge derived from the recorded experience of others with the aid of the potent tools of mathematical methods and practical familiarity with the machines and processes to be handled.

The two factors supplied for the solution of this problem were: A bequest of money and ground, amounting in all to about $750,000, made by Mr. Edwin A. Stevens, and a faculty of young and energetic professors, headed by President Henry Morton, who had already distinguished themselves in their various departments.

It is now 21 years since this experiment was begun, and as we look at its results to-day we see our brightest anticipations and most sanguine hopes more than realized.

Graduates of the Stevens Institute are filling positions of the greatest responsibility in the workshops and great industrial enterprises of the country, and are in demand beyond the capacity of the Institute to supply them, and, on the other hand, applicants for admission have for several years so much exceeded the capacity of the Institute to accommodate them that considerable numbers have been refused admission, not for lack of adequate preparation (though the scholastic standard has been constantly raised), but because there was absolutely no room to hold them.

When we compare the means available with the work done, we are astonished at the result from a financial standpoint.

It must be remembered that never in the history of the world has an institution of the higher education, and especially one for industrial training, where extensive workshops and laboratories have to be provided and kept running, been self-supporting. In all cases, large subsidies from governments or large endowments from private individuals have been required to support such establishments, and that the Stevens Institute should have reached its present dimensions and completeness, with a building fund of but $150,000 and an annual income derived from less than $500,000 endowment fund, is simply marvelous in the eyes of any one familiar with the work and means of other institutions in this and other countries.

To be sure some help, timely, if relatively small, has been supplied by President Morton, who, in the words of Mr. Edward B. Wall, M.E., president of the Alumni Association, in a recent address, "has devoted to Stevens his ability, his energy, his time, his tact and his private fortune;" but, for such a work as this, an amount of between $40,000 and $50,000 is but a trifling element, except as it may have supplied a great need at a critical time, as when he fitted up and presented the new workshop in 1880, established the Department of Applied Electricity in 1883, and endowed a chair of engineering practice in 1888.

The fact still remains that the great success of the Stevens Institute has placed it in the position of a business which has outgrown its plant, and which must refuse orders for lack of capacity to fill them promptly.

With a manufacturing establishment the remedy would be simple, because such an increase in business would warrant an increase in capital invested, which could be secured in the usual ways. But with an educational institution, the case is different. Here there is no increase in earning capacity which will pay interest on the increased investment. On the contrary, as each student costs more than he can, as a rule, afford to pay, an increase in the number taught calls for an increase in the endowment fund, or its equivalent.

Realizing this situation, the alumni of the Stevens Institute have taken in hand the raising of an additional endowment fund, which may be used in the erection of new buildings, or otherwise go to the permanent support of the institution.

In this work we wish them all success, and are free to say that we know of no place where one or more of those liberal donations which have distinguished this era and this country would do so much good to the community at large and be a more lasting and creditable monument to the donor than the Stevens Institute of Technology.

In this connection we may say that we know personally that the name of any donor would be permanently associated with any department, building, chair or scholarship which he might endow or present.

The names of the trustees and faculty given below are eminently calculated to inspire confidence that the future administration of the Institute's affairs in all branches will be of the best character. The trustees are Andrew Carnegie, of New York; S. B. Dod, of Hoboken; A. C. Humphreys, M.E., of Philadelphia; Wm. Kent, M.E., of New York; Chas. Macdonald, C.E., New York; Hon. A. T. McGill, Chancellor of New Jersey; Henry Morton, Ph.D., Hoboken; E. A. Stevens, Hoboken; and Mrs. E. A. Stevens, Hoboken.

The faculty consists of: Henry Morton, Ph.D., President; Alfred M. Mayer, Ph.D., Professor of Physics; De Volson Wood, A.M., C.E., Professor of Mechanical Engineering; J. Burkitt Webb, C.E., Professor of Mathematics and Mechanics; Charles W. MacCord, A.M., Sc.D., Professor of Mechanical Drawing; Albert R. Leeds, Ph.D., Professor of Chemistry; Charles F. Kroeh, A.M., Professor of Languages; Rev. Edward Wall, A.M., Professor of Belles Lettres; Coleman Sellers, E.D., Professor of Engineering Practice; James E. Denton, M.E., Professor of Experimental Mechanics and Shopwork; Wm. E. Geyer, Ph.D., Professor of Applied Electricity; Thos. B. Stillman, Ph.D., Professor of Analytical Chemistry; Adam Riesenberger, M.E., Assistant Professor of Mechanical Drawing; Wm. H. Bristol, M.E., Assistant Professor of Mathematics; D. S. Jacobus, M.E., Assistant Professor of Experimental Mechanics and Shopwork; Robert M. Anderson, M.E., Instructor in Applied Mathematics. Graduate Assistants: J. H. Cuntz, C. E., M.E.; William J. Beers, M.E. Instructing Mechanic in Workshops: Matthew Lackland.

Referring to our illustration on the title page of this number, Fig. 3 is a general bird's-eye view of the Institute and its surroundings.

The Institute building proper consists of a main portion running east and west, with three wings running north, or back from it. Of these wings that to the west, or left side of the engraving, is occupied at present by the Chemical Department. The central and largest wing accommodates in two stories and basement the machine shop and foundry; while the easterly wing is occupied by the Department of Applied Electricity.

To the north of this east wing is seen the building of the Stevens School, or preparatory department, where over 250 pupils are now taught.

The arch and tower visible over the east end of the main building constitute the entrance of the Castle Point estate, occupied by the family of Edwin A. Stevens, the founder of the Institute.

To the right is seen the Hudson River and the portion of New York lying between Eighth and Thirty-second Streets.

Fig. 1 is an interior view of the Electrical Laboratory. At the left is the photometer (an inclosure made entirely dark and provided with a "Sugg photometer" and other appliances), and down the middle of the room are a series of brick piers with slate tops, to give steady support to the delicate instruments used in electrical measurements.

Fig. 2 is a view showing a portion of the main workshop. It, however, does not give an adequate idea of the number and variety of "machine tools" present, as many of these are concealed by others or are outside of the range of view.

Fig. 4 shows the Blacksmith Shop and Foundry, with the cupola furnace at the far end, where iron is melted to make castings.

Fig. 5 represents the experiment room of the Department of Experimental Mechanics, in which a great variety of work is carried on, not only with standard machines for determining strength of material, but also with steam and gas engines, pumps, compressors, and the like, in such a manner as to best show their economic efficiency.

Mental Improvement after Trephining.

This important subject is treated of in an article in a recent number of the *Medical News* by Dr. Hugo Engel, of Philadelphia, with special reference to a case in which an operation of this nature was carried out. The patient was a boy fourteen years old, who was said to have been mentally bright and physically healthy until his sixth year, when he became subject to convulsions. These began one day without any apparent cause, and have never since ceased for any length of time. There was no family history of epilepsy or insanity, and there was no accident to account for the onset of convulsions. The fits had been becoming gradually more and more frequent, until at last he was having as many as twenty-one in twenty-four hours. But the interesting point is that the boy's intellect is said to have been, up to the time at which the fits commenced, of a higher order than is usually met with in a boy of his age; but since the fits began a gradual deterioration had been taking place, until he became dull and vicious, and finally seemed simple and almost idiotic and not unfrequently maniacal. There was a peculiar conformation of the skull, the appearance being as if it had been crushed in at the junction of the parietal and frontal bones, and Dr. Engel seems to have regarded this as the result of premature closing of the fontanelles and too early union of the sagittal and coronal sutures, and, from the effect of this on the brain apparently, he was in the state of extreme mal-development which he showed. Except that he was endowed with speech—of a guttural and monotonous character, it is true—he resembled a savage young animal rather than a boy, in his behavior generally. Under a systematic use of the bromides the convulsions became much less frequent and less severe, but no great change was evidenced in the mental condition, and it was decided to operate with the view of relieving the abnormal pressure on the brain, which, from the conformation of the skull, it was thought must be present. Two operations were carried out by removing portions of bone from the right frontal and parietal bones immediately contiguous to the coronal suture. The second operation was carried out after an interval of three months had elapsed from the first. For five weeks after the first and for two weeks after the second operation he had no attacks, but after that they increased in frequency, but never became so frequent as before, while their character was very much changed, so that instead of severe convulsions with clonic spasms, he now had attacks of loss of consciousness, with slight twitchings; but the chief improvement was in his mental condition, and from an idiotic, sulking savage he developed into a bright, lively, and good natured boy. His former irritability and moroseness were replaced by good nature, and now to all inquiries he made intelligent replies, whereas formerly he only sulked when asked questions. He also expressed a wish to go to school, and his perception was wonderfully quickened, so that a complete change was the result of surgical interference in this case. Such a result is, of course, extremely significant; but it remains to be seen in what cases operative measures are likely to effect so much as they apparently did in this case. But at least Dr. Engel and his surgical colleague, Mr. Packard, are to be congratulated on the brilliant success which followed interference in a case which could not, even to the sanguine, have appeared very promising.—*Lancet.*

Honors for Mr. Edison.

The Society of Arts, London, has awarded the Albert Medal to Mr. Edison in consideration of his distinguished services in the progress of electric lighting, telegraphy and telephony. The Albert Medal was first awarded in 1864, and has often been given to distinguished electricians, among whom may be mentioned Faraday in 1866, Cooke and Wheatstone in 1867, Sir William Thomson in 1879, J. P. Joule in 1880, and Helmholtz in 1888.