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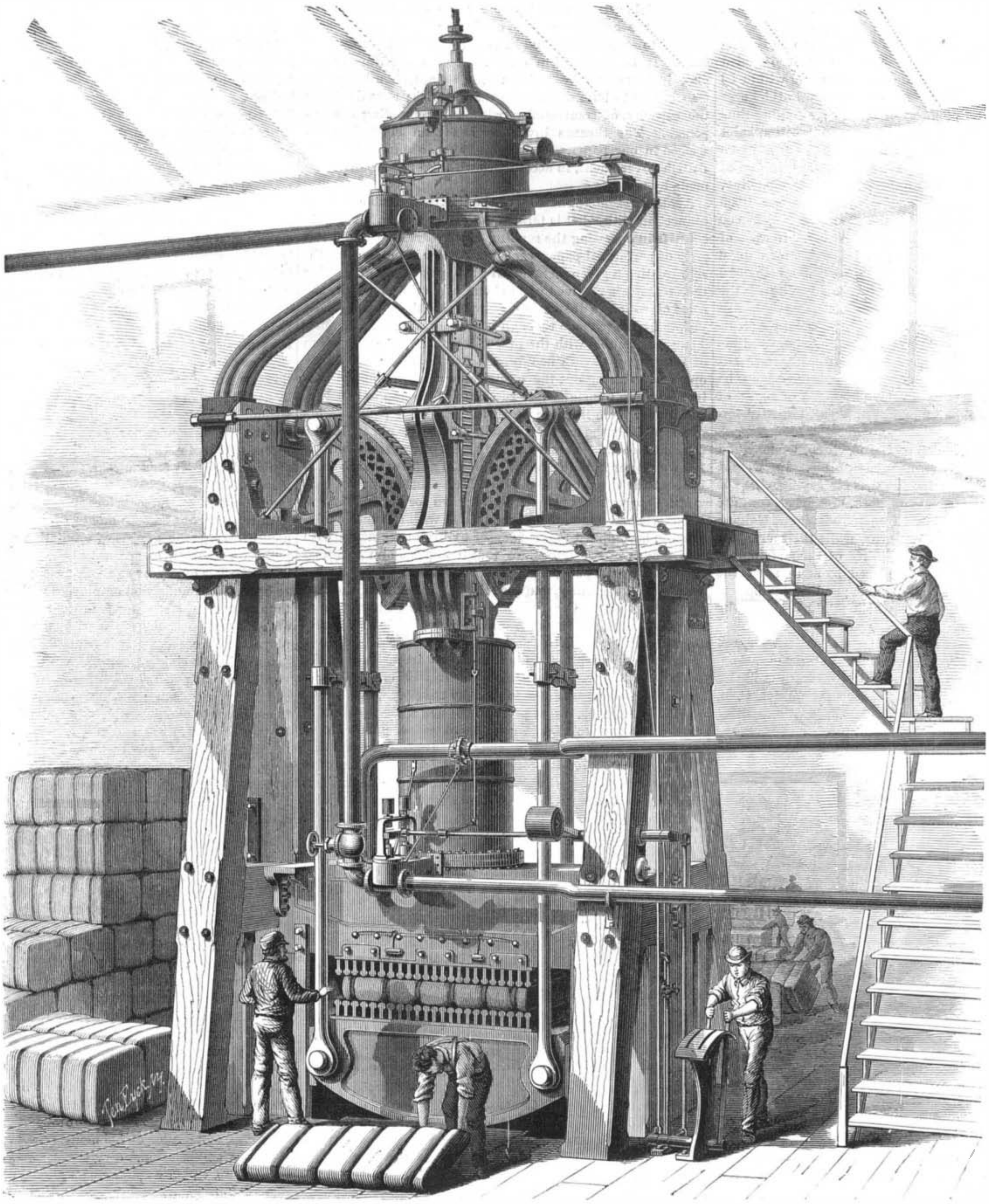
IMPROVED STANDARD COMPRESS.

It may be safely stated that the cardinal object, to be attained in the construction of mechanism designed for compressing bulky articles into a more readily manipulated form, is so to arrange the application of power that its effect be not diminished toward the end of the work; or perhaps, more accurately, so that the amount of force expended in performing the operation shall increase in direct ratio with the opposition it has to surmount.

Referring to the individual instance of that class of cotton or other presses, in which a steam piston is made to act upon a rack working between cog segments, connected by rods to the follower of the press in such a manner that the leverage will be increased as the follower is drawn up, it is hardly necessary to point out that, toward the end of the stroke, an immense force may be developed. But it has been found equally true, owing to the difference of sizes of articles of the same nature, to be compressed, bales of cotton, for example, that besides, from other causes, the power of the press is hardly sufficient to perform the work or to reach so near the end of its stroke as to render the gain by this increase of leverage available. It is, therefore, common, in order to attain the latter result, to employ a cylinder of larger size than is necessary at the beginning of the motion or with bales of comparatively small dimensions.

In the invention represented in our engraving, while the general plan above noted has been adhered to, two engines, instead of but one, are employed, and these are so arranged that a cylinder of comparatively small diameter applies the first and, consequently, the less powerful pressure. When this has reached the limit of its capability, the second engine comes into action and, by means of a large piston surface and short stroke, develops sufficient power to insure the completion of the pressure, and thus brings into effect the advantageous leverage already alluded to. By this means, it is claimed, steam is not only used in the most economical manner, but the construction affords four distinct gradations of the power, to be applied at will, as follows: First, by employing the smaller cylinder alone; second, by introducing steam into the larger cylinder in addition and causing it to work expansively therein; third, by cutting off steam in the smaller cylinder, so that it may there work expansively in connection with the steam in the large engine; and, fourth, by using steam direct from the boiler in both.

It is not considered necessary to enter into any detailed description of the mechanism, as a reference to the engraving will clearly indicate the quite simple construction of the invention. The points to be more especially noted are the mutual operation of the two engines and the results gained by actual practice. The machine from which our illustration was taken occupies a floor space of 14 by 18 feet, and an idea of its hight is readily obtained by comparison with the figures represented beside it. The lower single acting cylinder is 48 inches in diameter, and the upper one 60 inches; their strokes are, respectively, 9 and 4 feet. To afford a better notion of the operation, we need only describe the same exactly as we saw it a few days since. The material to be compressed was cotton, and a single bale, taken as a sample, weighed in the neighborhood of 500 pounds, and measured, before pressing, 52 inches. This was placed on the follower of the machine, and the engineer threw over one of the hand levers, shown at the right of the engraving. The effect of this was to vibrate a rock shaft, the lower one represented, and so open the steam valves of the lower cylinder. These valves, as well as those on the upper engine, are balanced as nearly as possible, and are claimed to possess all the advantages of both cylindrical and double puppet valves, as they work with little friction and are held on their seats with slight steam pressure. As steam entered the lower engine, the piston of course rose, and the rack upon it, engaging with the teeth of the segments and thus acting on the massive wrought iron rods, quickly raised the follower. This motion continued until very near the end of the lower engine's stroke, when the upper end of the piston rod entered a simple clutch formed by gibs, resting at their upper ends in bearings in a crosshead upon the lower end of the downwardly projecting rod of the upper cylinder. The gibs are hooked at their free lower portions, and are controlled by arms provided at their outer ends with rollers which work in grooves in the stationary frame. These grooves are so formed that, when the crosshead and clutch are in their lowest position, the hooks at the lower ends of the clutch jaws are drawn outward from the head of the rack; but, as they rise, are pressed inward and, by the shape of the frame, clearly shown in our engraving, kept in contact with the head of the lower piston rod.



GRADER'S STANDARD COMPRESS.

This clutch, acting automatically, coupled the ends of the two piston rods together, and at the same moment its gibs, as they expanded, actuated a bell wire and sounded a gong close beside the engineer, who, rapidly moving a second lever, admitted steam into the upper cylinder. At this point, the various gradations of power above noted may be employed in accordance with the nature of the work to be accomplished. The second and more powerful engine being now in operation, further compression of the bale followed. Six inches of stroke, we noticed, corresponded to one inch of movement of platen; and with a steam pressure of 125 pounds, this would develope a pressure of two thousand tuns.

Finally the limit of stroke was reached, and the follower had risen to a distance of between 7 and 8 inches from the immovable portion above it. Here the bale was held until the straps were passed and the ends secured,and then steam was allowed to escape from the upper cylinder, allowing the follower to drop.

It will be noticed from the drawing that the piston rod of the upper and larger engine projects up through the cylinder and terminates in a flanged collar. Beneath the latter is a rubber buffer, so that, as the piston descended, the falling weight was met by this elastic support taking against the top of the cylinder, and all jar is thus avoided. When the widened portion of the guides was reached, the clutch of course uncoupled, leaving the piston of the smaller engine to continue its descent, cushioning slightly on the contained steam. The rack and segments necessarily resumed their position as at the beginning of the operation.

So quickly is the work performed that,probably during the time the reader has devoted to perusing the above description, a dozen bales of cotton would have been pressed, banded and removed. In the case of the bale referred to in the beginning as 52 inches through, we found that it occupied about 5 seconds to complete the pressure; and within 50 seconds, the bundle was reduced to 14 inches in thickness and securely tied. The economy of space in shipping thus gained need hardly be pointed out. Estimating cotton bales pressed by other means as of an average thickness of 33 inches at the beginning,and supposing them to be compressed to the uniform dimension of 18 inches, here is a saving, we are informed, of 175 tuns admeasurement per 1,000 bales, while it is further claimed that, thus packed, 24,000 pounds of cotton can be stowed in a 28 foot car. In case of hay, the economy is even greater; for two bales, standing 6 feet 2 inches high,can be compressed into a single bale of 20 inches. A fair statement of the average capacity of the machine (judging from our own examination, together with the claims of the inventor) seems to be about 60 bales of cotton per hour. There are other advantages incident to thus compressing cotton into such perfectly compact form, in addition to that of economy of space; among which may be mentioned its greater facility in handling, less danger of being permeated by fluid or moisture, and also greater immunity from the peril of fire.

As regards the construction of the machine, we may add that it appears exceedingly strong and durable. Its weight is about 100 tuns. The follower rods,as already noted,are of wrought iron,while the segments, rack, crosshead, etc., are of gun metal. The cogs are cast from templates and claimed to be more perfect even than cut gear, while their strength, we are assured, precludes all possibility of their stripping. There are also powerful braces placed so as to meet the strains in the most advantageous manner; and rubber buffers are applied at the various points which might be jarred by sudden or too heavy impact.

The invention was patented by Mr. G. W. Grader, and may be seen in operation at the works of the Standard Compress Cotton Company, Nos. 108 and 110 Morton street in this city. Further particulars may be obtained from Mr. C. H. Close, of the latter address, or from Mr. J. H. Edmundson, Memphis, Tenn.

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NEW YORK, SATURDAY, NOVEMBER 8, 1873.

Contents.

(Illustrated articles are marked with an asterisk.)

MR. R. A. PROCTOR, the distinguished British astronomer, has recently arrived in this country. He proposes, we believe, to give an extended series of popular lectures, for which purpose he has brought with him a series of paintings illustrative of astronomical problems and discoveries.

THE ELECTRICAL CONDENSER.

In the working of the steam engine, the office of the condenser is to assist the power and economy of the machine, by rapidly removing the back pressure of the exhaust steam and converting it into water for re-use in the boiler. In a somewhat analogous manner, the employment of the electrical condenser appears to facilitate and improve the working of certain kinds of telegraphs. When a battery current is sent through an insulated telegraph wire, there is produced another current, termed static induction, which interferes with the operation of the battery current.

On the ordinary pole telegraph with the ordinary instruments, the static induction gives little trouble; but in the case of subterranean and submarine cables, the induced currents prevent the rapid working of the instruments.

The electrical condenser consists of tin foil, separated by sheets of insulating material, such as paraffin paper; and when the metal of the condenser is connected with the telegraph wire, it absorbs the electricity of induction, and changes it so that it acts to assist instead of retard the transmission of telegraphic signals by the instruments.

The various submarine cables could hardly be worked with commercial success, were it not for the combination with them of the condenser. The condenser has been recently applied to some of the land lines with greatly improved results. It is employed in connection with the Stearns duplex instruments, by which messages are simultaneously transmitted in both directions over one wire; thus doubling the capacity of transmission without augmenting the expenses. The Stearns invention has been heretofore described in our paper. It has lately been adopted by the British government, in accordance with the recommendation made by us.

Another recent application of the electrical condenser is in connection with what is termed automatic telegraphy. This consists in operating the sending key by drawing under it a strip of perforated paper, each perforation, of given length, representing a given signal. At the opposite end of the line the message is received upon chemically colored paper, the color of which is instantly changed and the signals made visible by the passage through it of the electrical currents. The great trouble with the practical working of this system of telegraphy always has been that the static electricity operated to string out the electrical waves, producing tailings, making the signals to run into or overlap each other, and render them illegible, upon the receiving paper. This was especially the case if a certain limit of rapidity in the transmission was exceeded. This limit of transmission was 100 words per minute over a line of 250 miles extent; which is about the speed of the common Morse instrument.

Mr. George Little, who is well known for his indefatigable efforts and ingenuity in connection with automatic telegraphy, has applied the condenser to his instruments with marvelous results. He states that it enables him to transmit 5,000 words, or 30,000 signals per minute, over one wire, with perfect legibility, and that the instruments of the Automatic Telegraph Company are now working the system at this rate between New York, Philadelphia, Baltimore, Washington, Mobile, and other cities.

This discovery promises to be of much importance in the business of electrical transmission. It will enable people to do their correspondence in full by telegraph, instead of by brief sentences, as at present. It will assist to prevent blunders in transmission, for which at present there is no remedy, except by double payment. It is well known that the Western Union Company will not otherwise guarantee the correct delivery of any messages sent over their lines. The successful introduction of the automatic system will, however, put an end to this extortion. The facility of transmission is so great that the Automatic Telegraph Company is now enabled to send twice as many words, for the same money, as the other lines; and thus the sender may make sure of a correct delivery of his message, without loss of time or payment of extra charges.

Another striking advantage of the electrical condenser is its use in connection with subterranean wires. It permits the transmission of signals with as much facility when the wires are placed underground as on the pole lines, and will enable our city authorities to pass ordinances requiring the removal of the many poles which now disfigure and encumber our streets.

PROGRESS OF SCIENTIFIC EDUCATION.

Two more munificent gifts have been made in aid of scientific education: one in the shape of a bequest of the sum of $200,000, by Mr. William Wheelwright, of Newburyport, Mass., lately deceased in England, for the establishment of a scientific school in his native place, and the other by Mr. Mr. Ario Pardee, of Hazelton, Pa. The latter gentleman, finding through his own experience the necessity of increased facilities for technical instruction throughout the country, some time since selected Lafayette College, in Easton, as the object of his donations. Although the aggregate amount thus bestowed had, up to some sixteen months ago, already reached a large sum, Mr. Pardee determined to found a complete scientific department, and to this end began, within the college grounds, the erection of the edifice, which quite recently has been formally presented to the authorities of the institution. This magnificent gift, while forming a fitting culmination to the series of benefits already rendered by its donor in furtherance of scientific learning, brings the total pecuniary value of his endowments to the large sum of half a million dollars.

The building, which has been named Pardee Hall, is five stories high, 256 feet in length, and is constructed of brown stone. It contains chemical and metallurgical laboratories, geological and mineralogical cabinets, large and elegantly fitted up lecture rooms, besides a spacious hall. The laboratories are said to be the most complete in their appointments in the United States. Accommodations are provided for 250 students. Pipes throughout the building convey gas, oxygen, hydrogen, sulphuretted hydrogen, steam, and blast, to all points where the same may be required. There is an elaborate set of chemical apparatus, together with a valuable stock of chemicals, besides models of machinery for mining operations and various industrial purposes.

The formal ceremonies of donation consisted in an address by Mr. R. W. Raymond, lecturer on mining geology in the college, on the "Necessity for Scientific Education," together with speeches by Mr. Pardee, the Governor of Pennsylvania, and Dr. Cattell, President of the Faculty.

THE STATE OF THE IRON TRADE.

There exists at present a general feeling of depression in the iron trade, and this more especially among the smaller firms. We do not share in the gloomy apprehensions of its permanency, however, throughout the winter, and it seems to us that there is ground for a much more hopeful feeling than that expressed in the majority of cases.

The railroad supply firms and locomotive works have probably suffered most, through the countermanding of orders. But the money which would have been expended in payment for the completed work is not out of existence, but simply locked up. The same is the case with regard to all other industries which have felt the effects of the crisis. Funds, if not in circulation, must accumulate; and when they once break over the barriers which confine them, there will be a superabundance of cash within easy reach. How soon this reaction will take place, it is impossible to say. The panic gave no warning of its approach, and we believe that the anomalous state of affairs which now causes the people to so closely guard their purse strings will disappear in an equally sudden manner. The only counsel to be given is simply to hope, and to use every effort to tide over the interval which may elapse before the resumption of easier times. The country is unquestionably in a prosperous condition, and industries generally are doing excellently well. Hence, as to the temporary nature of the present difficulties there is not a shadow of a doubt; and that they cannot much longer continue, we consider almost a certainty. Those houses which, by careful management, succeed in bridging over the chasm without making serious sacrifice, will, we further believe, when the reaction comes, clear sufficient to wipe out the record of the losses they may have incurred, and, besides, show a fair profit for the year.

Regarding the probable condition of the workmen, due to the reduction of force in many establishments, we notice with regret that the sentiments of one of our most prominent firms breathe a spirit of retaliation and a lack of sympathy for the men, on account of the part taken by the latter in the strikes of a year ago. Such expressions tend but to re-open old wounds, and employers will find that, instead of thus planting the seed for future feuds, they will serve their own interests best by considering the welfare of their employees. By assisting their men in a time of trouble, to the extent of their ability, they will engraft in them a feeling of gratitude which will serve materially to diminish the chances of future dissensions; while it will be but ordinary charity to endeavor to alleviate the condition of fellow beings who, from no fault of their own and for an indefinite period, are thus forced out of employment and compelled, as best they may, to face the hardships and miseries of the coming winter.

ELASTIC PROFANITY.

At a summer festive gathering on one of the Thousand Isles of the St. Lawrence, last summer, the Rev. Dr. Pullman, of Peoria, playfully gave, as a complimentary toast, "The health of the inventor of Elastic Profanity," in allusion to Dr. S. C. Barnum, of this city, who happened to be present, and who is well known in the dental profession as the author of the *rubber dam*. This is a device now in common use, for keeping fillings dry during the operation of tooth plugging, and is almost as indispensable for good success in dentistry as chloroform is in surgery,

The rubber dam is nothing more than a piece of sheet rubber, which is punctured and stretched over the necks of the teeth, serving to hold up the gums, and wholly prevent the access of saliva at the point where the filling is being introduced. It is not only a marvelous convenience for the dental operator, but affords great relief to the patient; for it in no way interferes with the natural functions of the tongue, muscles, and glands of the mouth. It enables the dentist to perform with ease and certainty a class of most necessary operations which were previously counted almost among the impossibilities by leading practitioners. In thousands of cases, teeth which before were condemned for extraction are now readily saved and filled.

The rubber dam was invented in 1865, by Dr. Barnum, and presented by him as a free gift to the profession, at the Dental Convention held in this city during that or the following year. Previous to the discovery of this device, dentists were obliged to resort to all sorts of curious contrivances in the attempt to keep their fillings dry. Among these was the duct valve, a round disk which was placed in the mouth of the patient, upon the orifice of the salivary gland, and there pressed by a clamp, to prevent the escape of the saliva. This was painful to the patient, as well as injurious, as it caused an unnatural engorgement of the gland.

Then there was the saliva pump. While the dentist was engaged in filling the tooth, an attendant stood by and worked a hand pump to draw off the saliva from the patient's mouth