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.

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year		$3 00
One copy, six months		1 50
CLUB RATES	Ten copies, one year, each $2 50	25 00
	Over ten copies, same rate, each	2 50

VOL. XXIX., No. 19. [NEW SERIES.] *Twenty-eighth Year.*

NEW YORK, SATURDAY, NOVEMBER 8, 1873.

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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

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