

## DIFFERENTIAL PULLEY BLOCKS.

This invention was the subject of a recent patent trial in England which has attracted a great deal of attention. In relation to it the London *Engineer* remarks:—

"Scarcely any new mechanical apparatus has ever worked its way so quickly into general use as the extremely elegant and ingenious form of hoisting tackle known under the name of Weston's Differential Pulley Blocks. It is stated—and we have no reason to doubt the statement—that not less than 26,000 sets have been sold within the last four years. Such a demand could not have arisen without a good cause, and it is probable that no workshop in this country is without a set. At Crewe Mr. Ramsbottom has adapted the differential pulley blocks to most of the lathes. A T-rail, set at right angles to the lathe bed, and at such a distance as to suit the face plate, affords the greatest convenience for adjusting the work. It is the fact, however, of their general use in unskilled hands which still more strongly testifies to their utility. As was observed by a scientific witness at the late trial, 'In engine houses, where formerly crabs were used, and it required perhaps half-a-dozen men to lift up the cylinder cover of the air-pump bucket for re-packing them, a couple of men can, with these blocks, now easily do the work.' The ropes of crabs are liable to break, and many an accident has occurred with a winch handle; but it is probable that scarcely any like occurrence has ever taken place with these blocks. In corn mills similar facilities are afforded for lifting up the runner for dressing the surfaces; and they are accordingly in extensive use by millers. Besides many other applications, they are of course extensively used by builders.

"Such a rapid development of the sale of a new article never takes place without the stimulus of a patent, without a greater or less number of persons being specially interested in making its principle and adaptabilities generally known. It is a further consequence that others are led to covet that intellectual property which is, or ought to be, covered by patent specification. A similarly general feature in most mechanical contrivances is, that they but seldom leap with Minerva-like completion from the inventor's brain, and that they have had a previous history, made up of a greater or less number of crude development. Previous inventors, with less perseverance and the other virtues requisite for success in the arena of invention, have made more or less incomplete attempts. In the fiery ordeal of a court of law the successful contrivance has thus to confront its previous history, so to speak; and the patent right of the last inventor—who may or who may not have given it that finishing touch which makes all the difference between practicability and impracticability—has to stand or fall by the result. Such is the general type of many of the patent contests in our courts of law, and the general features in the case of *Tangye vs. Stott* were repetitions of those previous patent cases.

"A brief repetition of the history of the progressive development will, thus give a clear notion of that portion of the defendant's case which could be said to be founded on *bona fide* statements. It is needless to describe at length the principle of the Weston's differential pulley blocks. Like most other things, its origin can be traced back to Chinese invention; under the name of the Chinese Windlass it has been known for centuries; and, like most other Chinese inventions, it has remained in an incomplete state for ages. It is not, perhaps, generally known that a windlass of the kind was found by the Allies to be in use for raising one of the drawbridges of the city of Peking. The enormous quantity of rope it requires has, says Professor Willis, 'been sufficient to banish the contrivance from practice,' at least in Europe.

"The beautiful principle of its differential motion should, however, one would have thought, have long ago directed the attention of mechanics to the practical development, by the aid of the modern command over less clumsy materials than wood and hemp, of the Chinese windlass. The first man who appears to have attempted this was Mr. Moore, of Bristol—apparently an ingenious schemer and amateur mechanic. What he produced was indeed a

pulley block, embodying the differential principle, and worked by chain. He stated in evidence that he invented it in 1830; that a model of it was deposited at the British Philosophical Institute at the Adelaide Gallery, and other places. It was also stated that such a pulley had been practically used. This pulley block was further described in a passage in a work by Dr. Carpenter, entitled 'Mechanical Philosophy, Horology, and Astronomy,' published in 1844.

"After evidence showing clearly that Weston's invention resulted in little less than the development of previously barren ideas—that it was not merely a considerable difference, but also as great an advance on Moore's apparatus—the issue could scarcely be doubtful. With a verdict for the plaintiff has thus ended one of the most remarkable patent trials which have lately occurred, whether we regard the importance of the issues or the sensational character of one portion of the evidence. But stranger than any thing which did really occur would have been a completely realized supposition that such a simple and efficient contrivance could remain buried for more than a quarter of a century in a popular work on science, and on the shelves of popular resorts for scientific information."

## NEW PUBLICATIONS.

MANUAL OF THE ALDEN TYPE-SETTING AND TYPE-DISTRIBUTING MACHINE. An illustrated exposition of its mechanism, with tabular statements of the weight of every piece, including estimates of cost of labor and material, a summary of the amount of type setting annually executed, an authentic sketch of the history and progress of the invention, with a proposed plan of future operations for the Alden Type-setting and Distributing Machine Company. By Charles C. Yeaton. New York: Francis Hart & Co.

The volume under notice is a new thing in literature, and marks an advance in the mechanic arts. It is in verity an immense factory on paper, and yet in full operation, each thing to be done and tool for doing it being minutely and exactly described in form, material, weight, cost, and durability; and all the directions so clear that any good mechanic in any country, by simply following its directions, could start a factory for the production of five Alden Type-setting and Type-distributing Machines every day, without any previous instruction, just as well as though he had served on the machine from its first imperfect inception in the mind of Timothy Alden to its magnificent completion under Mr. Charles C. Yeaton, who has left us the record of his progress, and the men who labored on it, in these pages. No work of a similar kind has ever heretofore been seen, to our knowledge; but that the example it gives, for the most efficient organization and economical management of large manufacturing interests, will be widely and promptly followed, is just as certain as that all intelligent manufacturers will avail themselves of all important aids and economies in the prosecution of their business. Our factory system, as now existing, is not one that is organized or created as a whole, but that has "grewed up," like "Topsy," from small beginnings to large proportions, through the personal experience and labors of its governing minds. No sound rules for its continuance are on record, save in the individual heads of the foremen or master mechanics to whom each branch of the work is intrusted; and thus it comes to pass that when any one of these may die or be discharged, there is found serious difficulty in finding any one competent to fill his place; and both the goodness and economy of the manufacture fluctuate as the men immediately employed in its direction have more or less skill and experience. In Mr. Yeaton's book this manufacturing difficulty is boldly grappled with and abolished. He has a machine of infinite complexity of parts, and yet the greatest simplicity of principle, to construct; and thoroughly understanding the subject himself, in all its theoretical and practical workings, has put on record in this volume instructions so clear and tables so minute for the performance and cost of every item of the wonderful semi-automaton, that a thousand factories could be started to-morrow, by as many first-class mechanics, with only this book to guide them; and if they followed its instructions, each factory would be as good as every other, the machines they would construct would be precisely similar, the minutest parts of their machines would be interchangeable

without detriment or irregularity, and the cost of production in any country could only differ from the cost in other countries by variations in the value of labor and materials. That such a code, for the regulation of a single branch of manufacture as is here given, must in time produce a change in the management of all factories and the general organization of mechanical industry, we hold to be beyond dispute. Factory owners will see in the production of similar volumes, each for the control and guidance of his own branch of business, the immediate attainment of the following important desiderata:—Uniformity in the work performed; the strictest economy, free from parsimony, in its performance; independence of the changes and chances which affect the lives and labors of the managing foremen in important situations; and the ability either to start similar factories, if desirable, with new men who shall be equally good with the most experienced hands under such instructions, or to transmit their business to an heir, or to some new purchaser, with no apprehension that the change of individuals in control will produce any change or deterioration in the quality or economy of the manufactured article. Of the Alden Machine we gave an illustration, with an accompanying verbiage or word-picture, in a previous number, and then pronounced it one of the greatest and most curious triumphs of mechanical ingenuity and the heroism of undaunted perseverance. In the volume under notice—of which but one hundred copies have been printed, altogether for the use of the Alden Machine stockholders and the guidance of their factories here and in Europe—we see how the great task of its successful prosecution has been pushed to success, and recognize in the mind of the writer those habits of order, indefatigable industry, and a courage quailing before no obstacles, without which the imperfect and unfinished discovery of Timothy Alden must have "died and made no sign," or simply remained to be scrutinized by the few as a curious but unsuccessful illustration of inventive genius.

## MISCELLANEOUS SUMMARY.

WHEN oxygen is converted into ozone, by passing through it a current of electricity, a diminution of volume takes place. The greatest contraction occurs with the silent discharge, and amounts to about 1-35th of the volume of the gas. The passage of sparks has less effect than the silent discharge, and will even destroy a part of the contraction obtained by the latter. If the apparatus be exposed for a short time to the temperature of 250 degs. centigrade so as to destroy the ozone, it will be found that the gas on cooling has recovered exactly its original volume.

WHILE experimenting on the qualities of silver present in sea water, Mr. Field, F.C.S., stated that he had examined some Muntz's metal sheathings which he had obtained from the captain of the brig *Nina*, which had been some time in the Pacific. In 1,700 gr. of sea water, he found .003 per cent of silver or 19 dwt. 14 gr. per tun, while, in examining the same quantity of metal which had been fastened to the ship's bottom, he found .023 per cent, or 7 oz. 13 dwt. 1 gr. per tun.

CYRUS H. McCORMICK, of Chicago, the well known inventor of McCormick's reaper, has given \$10,000 for the establishment of a professorship of practical mechanics in Washington College, of which Gen. Lee is the President. McCormick is a native of Rockbridge County, Virginia.

A COMPANY, with a capital stock of three hundred thousand dollars, has been formed in St. Paul, Minn., for the purpose of working in the newly discovered gold mines of that State.

FROM Professor Airy's pendulum experiments at Harton Colliery, the mean specific gravity of the earth is found to be 6.566.

WHILE American farmers are trying all sorts of bushes and shrubs for live fences, English farmers are rooting them out, as cumberers of the ground.

OVER two hundred mechanics and operatives are in constant attendance at the Cincinnati School of Design.

IT is estimated that thirty tons of white paper are used daily in the manufacture of paper collars.