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## A NEW SCIENCE.



KNOWLEDGE is like a grafted tree whose roots strike deeply into the past, and whose branches extend upwards and outwards into the present and future. Science is the fruit of this tree, and of late years it has rapidly multiplied in variety and greatly improved in quality. "Social science" is a new fruit which has appeared on this tree, and it promises to be one of the most valuable species that hangs upon its bows. The welfare of man, as a social being, should be the aim and end of research in science and art; but hitherto this great truth has not been duly appreciated. Knowledge, like rank and wealth, has been most generally viewed as a power to be employed for ambitious purposes; but we trust that a better era is dawning upon the world. Social science differs from every other in one striking feature. It is not like mechanics or chemistry, which expand and are sub-divided into branches with an increase of knowledge; but, on the contrary, it lays all the common sciences under tribute and collects facts from every source, so as to bring them to bear directly upon the welfare of man as a social being. The devotees of this new science have a particular organization, which has had an existence for several years, in Great Britain, as a most respectable association. Among its members are some of the very greatest men and noblest spirits in that country, and at its meetings lords and dukes mingle together with mechanics and merchants to express their opinions and consult together for the promotion of the general good. The last annual meeting of this association was held in Glasgow; Lord Brougham made the introductory address, and subjects of very great importance to mankind in general were discussed. The effects of machinery upon labor, the effects of different trades upon the health of women and men, and the effects of "trades' unions" and patent laws formed topics for several reports and papers. Such a science and such discussions we hail with pleasure. They are of infinitely more importance than Darwin on the "Origin of Species," "Pre-Adamite Man," or any of those works on natural science which have lately caused so much vehement talk among the scientific dons in both hemispheres. What subject, for example, is of deeper import than the effects of different occupations on the health of operatives? None whatever in a social sense. Well, numerous new facts relating to this question have been collected and arranged, and measures based upon such information have been instituted for the better ventilation of many factories and workshops, and both employers and their workmen have entered upon a career of co-operative effort for the promotion of such social reforms. We can merely allude to these topics, but must not omit that of "trades' unions," or combinations by which strikes have resulted in injury to all classes. This has been a most perplexing element in the social life of the mechanical classes. Statesmen have made laws against trades' unions, and have been glad to repeal them again; because, instead of curing, they only aggravated the evil. Social science now grapples with the subject and endeavors to throw a beam of clear light upon it. At the last meeting of the association referred to a report was presented on this subject, a few words of which we quote as follows:—"The

workmen belonging to these societies form a better estimate now than heretofore of the condition of their respective trades; and they have generally overcome the prejudices which they once entertained against machinery, and their leaders are men of high character and intelligence. The improved education of masters and of men is doing more to avert collisions between them than any mere artificial arrangement of a voluntary or forced character."

We are glad to see such questions brought within the domains of science, where they can be examined and discussed in a dispassionate manner. Legislative enactments are merely negative regulations for evils; they seldom operate positively in doing good. We hail social science as a new and superior agency for removing many evils and for promoting the welfare of men.

## THE BEST FORM OF STEAM ENGINE FOR MANUFACTURING PURPOSES.

The superiority of steam power over other motors having been fully argued before, we shall not review that subject, but say a few words upon the form of engine, relating to economy and other particulars of the machine, which is best adapted for manufacturers.

The ordinary horizontal engine is the one most generally used, from the simplicity of its construction, its lessened first cost, and from the fact of its being more easily handled by the uninstructed engineer, of whom, for the benefit of capitalists, there are but too many in employment. We shall argue the fitness of the horizontal engine for its purpose over others of different pattern of the same size. In the machine under consideration there is at the outset an objection in the position of the cylinder and its piston, as it increases in size the evil alluded to—that of the weight resting on the bottom of the cylinder—is not lessened but augmented, and with daily use, it is only a question of time when the cylinder shall require reboring. In the matter of packing, which renders the piston steam-tight, there is a word to be said. It is not possible to adjust it so perfectly or evenly as in the case of the engine which we shall mention. We saw only a few days ago a cylinder belonging to a horizontal machine which required reboring. Upon examining it carefully it was found to be scored deeply on the bottom, while the top was very little worn. We deduced from this inspection that the engineer had inserted the springs to the best of his ability, and supposed that he was extending the rings equally throughout the circumference; whereas, the fact was plain that the weight of the piston had been too great for the bottom springs to sustain, and they had set under the pressure with the result mentioned. If we add also the fact that the constant wriggling of the packing (we cannot use a more expressive word) tends to produce a hard gritty powder, and consider the extraneous substances which are deposited with the steam on the bottom, we shall have the secret of scratched cylinders when the greatest care has been used in packing them. These parts and the valves being the heart of the engine, any injury occurring to them results in serious expense. When these engines have their steam chests upon the side, it will be found that the condensed water remaining after stoppage slowly and insidiously eats away the port, in some instances within our knowledge, through to the exhaust passage. It may be argued that the condensed water may be blown out, but more or less of it will remain, and this result is always to be apprehended.

Let us now glance briefly at the other form of engine which, we assert, possesses unusually favorable features, and which should render it universally popular—those with vertical cylinders; and we speak wholly from the plan of the engine, and not from personal bias in favor of one or the other. The points most noteworthy are: an upright cylinder and steam chest, a more even and easily balanced apparatus, and a release of the guides from the superincumbent weight of the crosshead and piston rod, besides a general system of vertical motions throughout. From these specialties there arise important results, which are: a diminution of friction, greater regularity of motion (caused by opposing weights balancing each other), and last, though not least, a preservation of the vital parts of the engine from injury. More especially at this time would we speak of the beam engine as pre-eminently adapted to manufacturing purposes.

On this excellent form of engine there can be no criti-

cism made worthy of special attention. It is true, there are many bearings about them, but in a well built engine the labor is very slight on them, and is more evenly distributed than in the horizontal machine. No more perfect plan can well be devised. In a properly constructed beam engine the weight of the front links, crosshead and piston, with its rod, should just balance the connecting rod and its crank or cranks; and though the equipoise depends of course upon the velocity of the machine, it can be easily adjusted by weights. Centrifugal force increases as the square of the velocity; therefore, what is equally poised at one speed will not be so at another. There are many engines of the class just spoken of in use, and we venture to say, upon our own responsibility, that the proprietors of them would not exchange them for any other plan. Their better qualities are so apparent that there should be more of them in use at the present day—a much smaller bill for repairs and for fuel would be one of the important desiderata achieved.

## CLOSER ECONOMY IN STEAM POWER REQUIRED.

With a constantly increasing system of manufactures going on in the country, it becomes necessary to consider what means may be adopted to render the expenses less, and, as a natural consequence, the profits greater. A careful observation in various parts of the States has convinced us that many slight things, or those which appear so, are daily overlooked, resulting in individual loss and delay. It is not in thickly settled neighborhoods that so much waste is observed, but in bye places and obscure streets, where vigilance is relaxed to an alarming degree; in shops where every person runs the engine to suit the work he may happen to have in hand; where the man who tends the engine is indifferent about the supply of feed water, and where the coal is thrown into the boiler in a pile; where the oil is poured into the cups until they run over, and the can carried from one to the other without elevating it. We are not depicting suppositious cases; we have seen that which we write of, and know that such extravagance is daily carried on. What other result may be expected than an unnecessary bill for wasted materials? A simple leak about a washer, or a standing bolt, that loses a jet of steam may seem a small thing to criticize, yet how many such leaks are there not observable in obscure corners that waste steam, which is as certainly money as a bank bill? It may be asked how these things are to be remedied, and we reply, in most cases by the personal supervision of the proprietor; but there is another preventive in which we have great faith, and that is the general integrity and fidelity to their employers' interests of our engineers and mechanics; without whose watchfulness, the inspection, however severe, of the capitalist is of no avail; and we place unbounded reliance on them from a knowledge of and from daily contact with their characters. We ask their attention to these apparently small, but really important matters, confident of the most favorable results.

PHILADELPHIA TURBINE WHEELS.—The Philadelphia *Ledger* says that the new turbine water wheels, now being constructed in that city, for the extension of the water works at Fairmount, will be the largest ever made in this country, each of them being nine feet in diameter, two feet more than the one now in use at Fairmount. It is calculated that the three new wheels will force as much water into the reservoir as the eight breast wheels and the turbine, just doubling the capacity of the works. The size of the new wheels renders the construction of new and large tools necessary. The lathe upon which the casing is to be faced will have to swing a portion of the case, which measures nearly 18 feet in diameter. It is said that no shop out of Philadelphia has the capacity for making these wheels, the cylinders for the Ericsson steamer having been sent from New York to Philadelphia to get bored.

WATERPROOF COATS.—Sometime since a correspondent wrote to us from Mobile, suggesting the importance of making waterproof coats so that they would not be sticky. We have recently examined some coats which are entirely free from this serious objection. They are manufactured in large quantities by Samuel C. Bishop, No. 181 Broadway, this city.