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Contents.

(Illustrated articles are marked with an asterisk.)

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For the Week ending August 10, 1878.

Detailed table of contents for the supplement, categorized by I. ENGINEERING AND MECHANICS, II. TECHNOLOGY, III. FRENCH INTERNATIONAL EXPOSITION OF 1878, etc.

PROGRESS OF IRON MAKING.

The success of the Dank's puddling furnace fired with pulverized coal seems to be no longer a matter of doubt in England. It is stated that Messrs. Hopkins, Gilkes & Co., the well known iron makers of the North of England, have succeeded in turning out from it from Cleveland pig alone iron capable of bearing tests which Staffordshire iron has not yet surpassed.

We are now underselling the English at home and abroad in many articles of manufacture, because so much of our work is done by machinery, and is consequently better and cheaper than can be produced by hand labor at the lowest living rate of wages; but so soon as the English masters and workmen shall fully appreciate this fact, the same machines run there with cheaper labor will deprive us of our present advantages.

Already we notice several instances in which the workmen, renouncing their prejudices, have willingly consented to the substitution of machine for hand work, and we doubt not that the success of these innovations, conjoined with the pressure of the times, will ere long create a complete revolution in the ideas of the British workmen, so that instead of longer opposing they will demand the improved appliances and facilities for work, converting them from rivals or opponents to allies.

THE TELEPHONE AS A PROMOTER OF SCIENCE.

Every new thing, whether it be in the realm of mind or matter, has an influence on whatever existed before, of a similar kind, to modify, develop, and improve it, or to doom it to oblivion. Whatever is new necessitates a better knowledge of the old, so that the world gains not only by the acquirement of the new thing, but also by a better understanding of things already known.

A discovery, published, sets a thousand minds at work, and immediately there is a host of experimentalists who, in their desire to make and try the new thing for themselves, begin without a knowledge of the science or art to which the discovery pertains, and inevitably fail. After failure comes research, which to be of value must be extended. Every investigator can recall the novelty that induced his first experiments, and can recount his trials in his search for information.

Among the inventions or discoveries that have induced extended experiment, the telephone may, without doubt, be mentioned as the chief, for no sooner was the first speaking telephone brought out than here and there all over the country it was imitated. Persons who never had the slightest knowledge of electrical science had a desire to see and test the telephone. To do this first of all requires a degree of mechanical skill. Acoustics must be understood, and a knowledge of the four branches of electrical science is requisite, as the telephone involves galvanism, magnetism, electrical resistance, induction, and many of the nicer points which can be understood by investigation only, and this not only in the direction indicated, but in the allied branches of physics and also in chemistry.

LETTER FROM PROFESSOR HUGHES.

We print in another column a letter received from Mr. D. E. Hughes concerning the distinction he finds between his microphone and Mr. Edison's carbon telephone. Mr. Hughes is very confident that the two inventions have nothing in common, and that they bear no resemblance to each other in form, material, or principles.

We would not question Mr. Hughes' sincerity in all this. No doubt he honestly believes that the invention of Mr. Edison "represents no field of discovery, and is restricted in its uses to telephony," whilst the "microphone demonstrates and represents the whole field of nature." But the fact of his believing this is only another proof that he utterly fails to understand or appreciate the real scope and character of Mr. Edison's work.

To those familiar not only with Mr. Edison's telephone but with the long line of experimental investigation that had to be gone through with before he was able to control the excessive sensitiveness of the elements of his original discovery, it is very clear that Mr. Hughes has been working upon and over-estimating the importance of one phase, and that a limited phase, of Mr. Edison's investigations.

We propose shortly to review at length the evidence of Mr. Edison's priority in the invention or discovery of all that the microphone covers; this purely as a question of scientific interest. For the personal elements of the controversy between Mr. Edison on the one side and Messrs. Preece and Hughes on the other we care nothing.

THE SCIENTIFIC AMERICAN EXPORT EDITION.

The inquiry for American manufactured products and machinery abroad seems to grow in volume and variety daily. And though, in comparison with our capacity to produce, the foreign demand is yet small, its possibilities are unlimited. To increase the demand the immediate problem is to make known throughout the world in the most attractive fashion possible the wide range of articles which America is prepared to furnish, and which other nations have use for. As a medium for conveying such intelligence the monthly export edition of the SCIENTIFIC AMERICAN is unequalled. The table of contents of the second issue, to be found in another column, will give an idea of the wide range and permanent as well as timely interest of the matter it circulates. It is a magazine of valuable information that will be preserved and repeatedly read. The handsomely illustrated advertising pages supplement the text, and make it at once the freshest, fullest, and most attractive periodical of the sort in the world.

FOUNTAIN PENS.

For several days we have had in use in our office examples of the Mackinnon Fountain Pen, and find it to be a very serviceable and effective instrument. This is a handsome looking pen, with a hollow handle, in which a supply of ink is carried, and the fluid flows from the point in the act of writing. The necessity of an inkstand is thus avoided. One of the difficulties heretofore with pens of this character has been to insure a free and certain delivery of the ink, and also to bring the instrument within the compass and weight of an ordinary pen. The inventor seems to have admirably succeeded in the example before us. The ink flows with certainty, and there is no scratching as with the ordinary pen; it writes with facility on either smooth or rough paper; writes even more smoothly than a lead pencil; may be carried in the pocket; is always ready for use; there is no spilling or blotting of ink. The construction is simple, durable, and the action effective. One filling lasts a week or more, according to the extent of use. These are some of the qualities that our use of the pen so far has seemed to demonstrate; and which made us think that whoever supplies himself with a Mackinnon Pen will possess a good thing. The sole agency is at No. 21 Park Row, New York city.

THE SUN.

BY S. P. LANGLEY, ALLEGHENY OBSERVATORY, PA.*

When, with a powerful telescope, we return to the study of the sun's surface, we meet a formidable difficulty which our first simple means did not present. This arises from the nearly constant tremors of our own atmosphere, through which we have to look. It is not that the tremor does not exist with the smaller instrument, but now our higher magnifying power exaggerates it, causes everything to appear unsteady and blurry, however good the glass, and makes the same kind of trouble for the eye which we should experience if we tried to read very fine print across the top of a hot stove, whence columns of tremulous air were rising. There is no remedy for this, unless it is assiduous watching and infinite patience, for in almost every day there will come one or more brief intervals, lasting sometimes minutes, sometimes only seconds, during which the air seems momentarily tranquil. We must be on the watch for hours, to seize these favorable moments, and piecing together what we have seen in them, in the course of time we obtain such knowledge of the more curious features of the solar surface as we now possess.

The eye aches after gazing for a minute steadily at the full moon, and the sun's light is from 300,000 to 600,000 times brighter than full moon light, while its heat is in still greater proportion. The object lens of such a telescope as the equatorial at Allegheny is 13 inches in diameter, and it is such light, and such heat, concentrated by it, that we have to gaze on. The best contrivance so far found for diminishing both, and without which our present acquaintance with the real appearance and character of sunspots would not have been gained, depends upon a curious property of light, discovered by a French physicist, Malus, in the beginning of this century. Let A (Fig. 10) be a piece of plane unsilvered glass, receiving the solar rays and reflecting them to a second similar one, B, which itself reflects them again in the direction C. Of course, since the glass is transparent, most of the rays will pass through A, and not be reflected. Of those which reach B again most will pass through, so that not a hundredth part of the original beam reaches C. This then, is so far a gain; but of itself of little use, since, such is the solar brilliancy, that even this small fraction would, to an eye at C, appear blindingly bright. Now, if we rotate B about the line joining it with A, keeping always the same reflecting angle with it, it might naturally be supposed that the light would merely be reflected in a new direction unchanged in quantity.

But according to the curious discovery of Malus this is not what happens. What does happen is that the second

* For parts 1 and 2 see SCIENTIFIC AMERICAN for July 20 and July 27.