Science and Art.

Annual of Scientific Discovery.

PAPER—The *Annual of Scientific Discovery for* 1855, edited by Prof. D. A. Wells, will soon be issued by Messrs. Gould & Lincoln, of Boston, and will contain a great variety of useful and scientific matter. From the proof sheets we copy the following extract of an article on paper making in the United States, a subject of very great importance at the present moment :—

The enormously increased consumption of rags and other materials used in the manufacture of paper, with the consequent increased scarcity of the raw material, and the enhancement of the price of paper, have caused much attention to be given to this subject, both in England and the United States, during the past season. Efforts have accordingly been made to introduce new materials to serve as paper stock, to improve the method of working old materials, and to diminish the cost of the mechanical operations. The cause of the scarcity of paper-stock, in spite of an increased demand, would appear to depend on the circumstance that the raw material of paper-making is, in reality, the product of the wear and tear of a substance of very advanced manufacture, and depending for its quantity on the collateral causes which produce a greater or less activity in the latter. Hence, the stoppage or partial suspension of cotton and other textile manufactures is sufficient to account for occasional, and especially for local, scarcity.

We find that there are, in the United States, 750 paper-mills in actual operation. Allowing 4 engines to each mill, and calculating that each engine will make 300 pounds of paper a day, the quantity of paper made in the year will be as follows:—

Number of mills, 750 ; number of engines, 3,000 ; number of pounds of paper per day, 900,000 ; number of pounds of paper in the year, allowing 300 days to the year, 270,000 000 ; value of this paper at 10 cents a pound, $27,000,000.

It is estimated that one and a-half pounds of rags are required to make one pound of paper. Adopting these data, we find that 405,000,000 pounds of rags are consumed in one year; their value, at 4 cents a pound, being $16,200,000.

The cost of labor is 1¼ cents upon each pound of paper manufactured, and is, therefore, $3,375,000 a year; and the cost of labor and rags united is $19,575,000 a year.

The cost of manufacturing, aside from rags and labor, estimated from adding together the cost of felts, wire-cloth, bleaching powders, fuel, machinery, interest, and fixed capital, insurance expenses, &c., we find to be $4,-050,000. Adding this to the cost of rags and labor, we find that $23,625,000 is the total cost of manufacturing paper worth $27,000,-000, a measure of profit by no means unreasonable, and which might even be considered small, were not the manufacture comparatively free from those sudden changes that affect the manufacture of cloth and metals.

Light as we may esteem it, there are few branches of business of more importance than the rag trade. No other country in the world, strange to say, is more dependent upon rags than the United States; and this is, in a great measure, attributable to the immense consumption of paper in the publication of newspapers, magazines, and works of all kinds, besides what is used for commercial and mercantile purposes.

For the four years, 1850, '51, '52, '53, the quantity of rags imported into the United States amounted to 97,846,035 pounds, costing $3,262,000, or about 3⅓ cents per pound.

In 1850 we imported rags from nineteen countries ; in 1852 from thirty-two ; which increment seems to have arrived near the ultimate limit.

Italy seems to be the great source of supply. In 1850 we obtained nearly half as many pounds from there as from all other places, while the amount paid exceeded half the whole sum. In 1851, the quantity and price of Italian rags only exceeded one-third of the amount by a trifle.

In 1853, there were 304 paper-mills at work in England, 48 in Scotland, and 28 in Ireland. The duty (three half-pence per pound) amounted to upwards of £925,000, so that the annual value of paper manufactured in those countries could not be less than £3,700,000, the average value of paper being estimated at sixpence per pound.

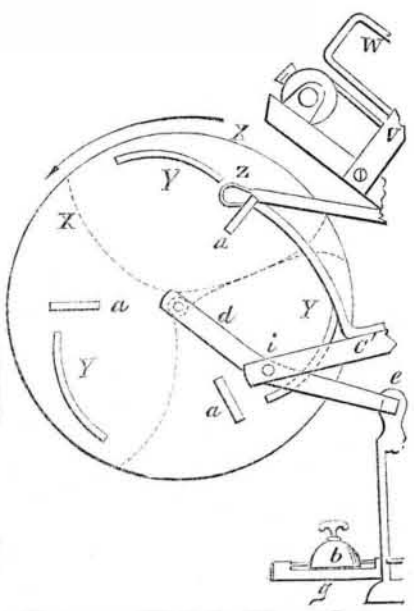
France, with a population of 36,000,000, turns annually into paper 105,000 tuns of rags. Of these 6,000 tuns are imported. In that country the exportation of rags has been prohibited by law since 1850.

England, with 28,000,000 inhabitants, requires yearly 90,000 tuns of rags, 15,000 of which are imported.

The consumption of paper in the United States is said to be equal to that of England and France added together. There are used here 6,000 tuns of straw for wrapping paper and paste boards, and during the last few years the importation of rags has averaged 10,000 tuns.

History of Reaping Machines.—No. 19.

FIG. 45.



On January 8th, 1851, Edward Neely, of Savannah, Ga., obtained a patent for a rotary reaper, embracing three claims relating to the suspending of the cutting ring, and the method of raising the cutter over obstructions, and guiding the machine: (see claim, page 142, Vol. 6, SCI. AM.) On the 5th of Feb. following a patent was obtained by Sidney S. Hurlbut of Racine, Wisconsin, embracing two claims, the object of the whole point of the invention being embraced in a method of conveying the cut grain from the sickle, and weighing it in bunches of a uniform weight, then depositing them upon the ground, ready to be bound.

The annexed figure (45) being a front elevation of the weighing machinery. W is one (the top one) of two movable rods to receive the grain as soon as it begins to ascend the inclined plane, and they press upon the grain until it arrives at the weigher; *d* are levers whose fulcra are at *i*. The weigher is divided into three compartments, X. It may be made of light sheet iron. Upon the front end of the weigher are stops, *a*, and curved guides, Y. Z is a roller intended to relieve stop, *a*, from the catch, as soon as the weighter, X, has received, enough of grain to form a sheaf, and to cause it to gravitate below the end of the catch. The weigher being a broad cylindrical receiver, with the chambers, X, after it has descended until it is below the roller, *z*, immediately revolves one-third of its circumference, deposits a sheaf, and resumes its proper position by the weight, *b*, which preponderates, and it is again arrested by the next radial stop, *a*, coming in contact with the catch, which holds it in position until the next cell, X, below W, receives its proper quantity of cut grain to form a sheaf, when the weigher relieves itself as before, carrying down and depositing the succeeding bunch. It is thus a self-acting rotary bundling and weighing apparatus, combined with the cutting and conveying machiney. C′ is one of two stationary arms, one is made fast to the front, and one to the rear end of the frame ; the ends of these act as fulcra for the levers, *d*. In the upper end of these levers the journal of the weigher revolves; *i*, is a pin, on which these levers are hung at their middle, and their lower ends are let into the bar, *e*, which extends across the end of the frame, from the middle of which the forked rod descends, and is attached perpendicularly to the balance beam, *g*. This weigher, with its contents, can be regulated so as to make a sheaf of any desired size or weight by simply sliding the weight, *b*, in or out—nearer or further from the end of its lever. A ratchet and pawl are employed to make this rotating weigher always revolve in the direction of the arrow: (see claim on page 174, Vol. 6 SCI. AM.) On May the 20th following, W. Watson, E. S. Renwick, and P. H. Watson, of Washington, D. C., obtained a patent, the object of the inventors being to cut, rake, and bind the bunches by automatic movements. The patent embraces six claims: (see page 294, Vol. 6, SCI. AM.) On June 10th, same year, N. T. Allen, of Ludlowville, N. Y. obtained a patent for operating the gearing of the machine from both wheels to equalize the driving power upon each: (see claim, page 318, Vol. 6, SCI. AM.) On the 24th June, 1851, a patent was granted to Wm. Start, of Smyrna, Ill., for an improved harvester, which is illustrated by a perspective view on page 393. Vol. 6, SCI. AM.; the claim will be found on page 334, same Vol.

The Bottom of the Ocean.

The bottom of the ocean is as unequal as the surface of the earth. Beneath the waters of the seas there are mountains, hills, and valleys. Some of these have bold and precipitous sides, while others swell gradually from base to summit. The average depth of the sea between England and France, in the Channel, is only 30 fathoms, and is uniform, as has been proven by laying down the telegraph cable. The bottom of the Mediterranean sea, on the other hand, is very deep, being no less than 250 fathoms, and in one place 360. In laying down a submarine telegraph cable last summer, between Piedmont and Corsica, Mr. Brett, the gentleman who constructed the line, came to a place where the cable flew off with a frightful velocity, and it was found that the depth suddenly varied from 100 to 350 fathoms. No map better explains the varying depth of the ocean, its hills and valleys, than the one on page 256, Vol. 9, SCIENTIFIC AMERICAN, which exhibits the deep sea soundings taken by American naval vessels. A very good idea of what the bottom of the sea is like may be obtained from the face of the dry land, as there is abundant proof of many parts of it being once the floor of the ocean. All Long Island was at one period covered with the sea, and the whole interior of New York State, and a number of our Western States, afford numerous evidences of having once been covered with water.

Intense Cold.

On the nights of the 6th and 7th inst, the weather was colder over a wide extent of our country than has been experienced for fifty years. In New York City the temperature was 6° below zero; at Albany, N. Y., it was 20°, at Syracuse, N. Y., 20°, and 30° at Ogdensburg, N. Y. In some parts of Vermont and New Hampshire, the mercury was frozen, so that, according to an Irishman's opinion of the subject, "it couldn't have been any colder unless the glass had been made longer."

The cold was indeed intense, and the poor suffered dreadfully. This winter, in our large cities, has been more trying to the poor than any in the history of our country. So many are out of employment, and provisions are so dear, that the suffering is not only very wide spread but very severe. Well fed persons can endure more cold than those who are poorly fed; now it so happens that fuel being so very dear, as well as provisions, that the sufferings of the poor have become doubly complicated and intensified. We hope for an early Spring, and better times.

A Small Earthquake.

A severe shock of an earthquake was felt throughout Maine and New Brunswick on the night of the 7th inst, the night of severest cold. The earth below seemingly was affected by the cold, as the atmosphere is during great heat. May there not be some relation between the phenomena.

The Minie Bullet in America.

We have been shown one of the Minie bullets which are now being extensively manufactured at C. Sharp's factory, at Hartford, Conn., to be used in his breach-loading rifles. We are told that they are the very things for his rifle, rendering it perfect in its action.

LITERARY NOTICES.

ENGINEER'S POCKET COMPANION FOR THE FIELD—This is a neat and very useful work, by Walter Griswold, of Buffalo, N. Y., and published by Miller, Orton, and Mulligan, of the same place ; it is a book composed of notes, which the author had been collecting for a long time. It contains a most instructive and most useful chapter on the "Art of Levelling," which is intended for new beginners. It is plain and clear, dispensing with terms that are liable to confuse the mind,—using only plain language. This little volume will no doubt meet with an extensive patronage.

THE WESTMINSTER REVIEW—No. 1 of Volume 40, of the above-named excellent Review, has just been issued by the enterprising American publishers, Leonard Scott & Co., No. 54 Gold street, this city. The leading article is on the Anglo French Alliance, and is both able and profound. The second article is on the Ballads of the People, and is a rich intellectual treat. An article on Poland—her history and prospects—should be read by every person who wishes to be intelligent regarding the present state of Europe. This is an excellent time to subscribe for this Review; it is liberal in its opinions. The price is only $3 per annum.

BLACKWOOD'S MAGAZINE—The first number of Vol. 40, of this able and monthly magazine, republished by Leonard Scott & Co., No. 54 Gold st., this city, contains a severe article on the British Ministry for the manner of managing the war in the Crimea. It also contains one of the most useful and instructive articles we have ever read on the Rural Economy of Britain and Ireland. It also contains the continuation of letters from the Crimea, by an officer. It is an excellent number. The price is $3 per annum. It has no superior as a literary publication.

THE PHRENOLOGICAL AND WATER CURE JOURNALS—These Journals continue, as usual, to dispense a monthly treat of the most useful and instructive matter. The Phrenological Journal contains the most entertaining articles in every branch of mental science, and the Water Cure Journal as faithfully explores every branch of physical education, both being presented in a homely and agreeable style. Messrs. Fowlers & Wells, 308 Broadway. Price $1 a year.

THE WAY OF LIFE—This is a neat little volume published by Fowlers & Wells, 308 Broadway, this city. The author is the Rev. G. S. Weaver ; its object is to point out the way that men should walk to enjoy happiness here and hereafter ; it inculcates spiritual mindedness and a devotion to truth and morality.