Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING) NEW YORK.

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

☞ "The American News Co.," Agents, 121 Nassau street, NewYork.

☞ "The New York News Co.," 8 Spruce street New York.

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VOL. XXVI., No. 19. [NEW SERIES.] *Twenty-seventh Year.*

NEW YORK, SATURDAY, MAY 4, 1872.

Contents:

(Illustrated articles are marked with an asterisk.)

DRYING SUBSTANCES BY MECHANICAL ACTION.

As we have said in former articles, the desiccation of substances may be effected, at least to a certain extent, solely by mechanical agencies. In these, we include all means whatever which do not involve material change of temperature, or chemical action. Prominent among them stands a class of substances which may be called absorbents. These act through their adhesive attraction for water, and therefore can only be useful when such attraction is equal to or greater than that of the substance to be dried. Thus, if it were attempted to dry fragments of glass by the use of powdered resin, the result would be failure, as the glass attracts water powerfully while the resin does not.

A familiar example of drying by absorption is found in the use of blotting paper. This paper, being made porous and not being sized, attracts moisture and absorbs it far more powerfully than hard and sized writing paper, The former, therefore, will soak up and remove the greater part of a drop of ink from the surface of the latter. Chemists often use blotting paper to dry moist powders, precipitates, etc. So jewelers use boxwood sawdust for drying gold and silver ornaments that have been cleansed with soap and water. Sawdust in general is a good absorbent, and may be used to dry metallic objects, after their immersion in sulphuric acid for the removal of scale, etc.

Straining or filtering is another way of separating solids from liquids, but this rarely leaves the separated solid so dry that it needs no further desiccation.

A much more important process of mechanical drying is compression. This method is employed in many industries, sometimes to remove a waste liquid from a valuable solid, and oftener, perhaps, to separate valuable liquids from solids of less importance. The extraction of the juices of fruits for wines, cider, perry, etc., is thus performed; and although in the extraction of beet juice, maceration is practised to a greater or less extent, the press is still, we believe, most generally used.

In applying the press to the separation of liquids from solids, considerable skill and judgment are required. The fluid has to make its way, through innumerable small and constantly narrowing channels, to the exterior; and this is a work of time. To hurry it unduly will cause a waste of power, and often a deterioration of the product, by the expressing of essential oils and extractive principles which it is not desirable to remove. Thus castor oil is often found to contain an excess of a peculiar peppery, acrid principle, which has, through the action of heat and too rapid compression, been forced out with the oil from the ground beans. In the drying of textile fabrics by wringing or compression, much power is often needlessly expended by hurrying the process too much at first. In the wringing of wet goods, the texture is itself the press. In those machines, erroneously called wringers, which remove water by the use of compression rollers, the pressure is advantageously applied successively to different parts of the texture, and these machines constitute some of the best appliances for the drying of woven and knitted fabrics, yarns, etc.

Another very effective means of drying not only such fabrics but other substances, as sugar and the like, consists in the employment of centrifugal force. The substance to be dried is put into a circular revolving cage, of wire gauze or its equivalent, the meshes of which, while retarding the outward motion of the solid, do not obstruct that of the liquid which, by the rapid motion, is forced out and thrown off the exterior of the cage. This is a process of straining, centrifugal force being substituted for gravity. The water adhering to the interior of a bottle may be removed by making use of the same principle. The bottom of the bottle being held in the hand, if the bottle be rapidly swung around by the arm, as on the end of a spoke of a wheel, a few revolutions will impel all the water along the inner surface of the glass till it reaches the mouth of the bottle, from which it will be thrown through the action of centrifugal force. These centrifugal machines have been much employed of late. They are used in Cuba for drying sugar, to a great extent, and have proved very serviceable in many other industries.

THE CONGRESSIONAL SEWING MACHINE JOB.

The application made in the name of A. B. Wilson, to revive his expired patent for sewing machine feed, is still pending before Congress. The evidence presented before the Committee reveals some curious facts.

It appears that Wilson sold out all his rights in this extension some time ago, to Wheeler and Potter, the sewing machine millionaires, and this Congressional application is now being prosecuted in their interest and that of their associates composing the Sewing Machine Ring. They hope by the aid of Congress to get this patent of Wilson extended; and should they succeed they will be enabled to continue the enormous monopoly which, at the expense of the poor, yields them great wealth.

The evidence produced by the remonstrants, by affidavits of competent machinists in different parts of the country, shows "that the actual cost of making the sewing machines of the best quality now in the market need not exceed twelve dollars, and at fifteen dollars they will afford a very handsome profit. The figures taken from Singer's accounts, sworn to by him in 1870, prove that the machines made by that company from 1865 to 1871 cost less than twelve dollars, ($11.83), and they are sold to the public at not less than fifty-five dollars each. The aggregate of profit which must have accrued to the combination and their licensees is enormous. The number of machines, as stated in the evidence on Wilson's behalf, for seven years past is 1,882,479, at an average profit of thirty dollars; on the machines alone, not counting the profits on materials and on ornamented cases, etc., the enormous sum of fifty-five millions of dollars has been extracted from the pockets of the people, over and above a fair manufacturing profit.

The Ring have not improved their machines in any material points; they have made the same styles for fifteen years. They have added devices for hemming and filling, etc., but for these they charge generally an added price, and they have adopted only such improvements in these as they saw fit. The testimony is ample that the machines themselves are not substantially different from what they were fifteen years ago.

No better summing up of the whole matter can be given than is found in the decision of the Hon. S. S. Fisher, made by him in 1870, upon an application of Singer for an extension of a patent for his earliest invention. Mr. Fisher had been for many years familiar with the whole sewing machine controversy; he had also been of counsel for the combination in several of their suits, and as an intelligent and upright judge, he decided that Singer's patent, and others like his, ought not to be extended. He says at the close of his opinion:

The interest of the managers of the licensed sewing manufacturing concerns, who, six at least in number, have made affidavits for Wilson, or rather for the combination in this case, leads them to demand protection for their profits; but the interest of the public, and of hundreds of inventors whose improvements could not be used by them while this Wilson patent stood in their way, imperatively require that 'all barriers to a free manufacture and sale shall be broken down as speedily as possible, consistently with individual rights.' When they have fallen by lapse of time, Congress should not aid in building them up anew.

More than one thousand patents have been granted, since the original issue of this Wilson patent, for improvements in sewing machines, and more than five hundred in addition for special devices for hemming, felling, gathering, and cording on sewing machines; and only a few of these, which the combination have graciously condescended to buy or to license upon their own terms, have been allowed to be tested by use or to be put into the market for the benefit of the public. The inventors could not use their own improvements without machines to attach them to, and they have been forbidden to make the machines. The average cost of these patented improvements, in cash expended by the patentees in fees to the Patent Office, in models and drawings, and to the patent agents for preparing applications and specifications, can hardly have been less than $250 in each case. All of them have, if the Patent Office has done its duty, some points of novelty and value, and have been adjudged by the Government to be worthy of protection by patents. These inventors, besides the time given by them, have thus paid nearly four hundred thousand dollars into the Treasury of the United States, and the combination, through Wilson, now asks that there shall be no opportunity for them to receive any return therefrom, except at their good will and pleasure, for seven years longer. A large proportion of these patents will expire before the seven years will end, and thus a practical confiscation of them will be enforced, if Congress yields to the pressure of the monopoly.

The public interest requires that when an article has come into general use all barriers to its free manufacture and sale should be broken down as speedily as possible, consistently with individual right. If an inventor has produced a good thing, but the public are slow to perceive it: if he is obliged to spend the greater part of his original grant in preparing for its manufacture, in slowly bringing it to the public notice and in demonstrating its utility, and if it appears that, at the expiration of his first term, if the exclusive right is taken away from him, it is probable that all incentive to further exertions is likely to be destroyed, and no one else appears ready to step forward and take his place, it is obvious the public interest might demand an extension of the patent. But when an invention is used in thousands of households and is wanted in thousands more, the public interest equally demands that the inventors of the first crude forms of the implement, especially if they have already realized hundreds of thousands of dollars under their original grant, shall stand aside and permit the machine to be cheapened and improved by those whom they have shut out of the market. This wall of exclusive privilege has stood long enough in the way of those whose improvements and exertions would doubtless speedily diminish the cost of the machine one half or double its value to the purchaser."

PROGRESS OF ASTRONOMY.—THE VARIABLE STARS.

Next to the application of the spectroscope to practical astronomy, the use of the photometer promises to be of the utmost importance. We have often referred to these important tools of the scientist, and will now only mention one, of recent invention by Zoellner, of Berlin, Prussia, which in fact is a polariscope connected with a telescope. In the so-called polariscope, a ray of light may be made to disappear and reappear alternately, by turning an eye piece of Iceland spar, tourmalin, or other proper material around its axis, through an angle of 90°. This disappearance and reappearance is gradual, and the angle of rotation from 0° to 90° may therefore be used as a measure of the intensity of the light, a stronger light requiring more rotation, to be toned down to a certain standard, than a weaker light. The principle on which this instrument is based is the property of light that, when once reflected under certain angles or refracted by certain media, it becomes incapable of being reflected or refracted again except under certain conditions; the rotating eyepiece of the polariscope procures an alternation of these conditions, and therefore it is equivalent to a measure of light.

The results obtained by Zoellner, in measuring the relative luminosity of heavenly bodies may be summed up thus: Taking the light of Capella as the standard of measurement, or = 1·

PLANETS.	
Neptune	0·0007
Uranus	0·0066
Saturn	0·4
Mars	7·0
Jupiter	10·0
Venus, when full	48·0
FIXED STARS.	
Pollux	0·3
Regulus	0·4
Betelgeuse	0·5
Capella	1·0
Vega	1·2
Sirius	5·0
The light of the sun	55,000,000,000·0
The light of the full moon	10,000·0

In regard to the comparative amount of light given by stars of different magnitudes, when taking as a unit the telescopic stars of the ninth magnitude, we have:

Telescopic	star	of the	9th	magnitude	equals 1
"	"		8th	"	" 2·5
Visible	"		7th	"	" 6·0
"	"		6th	"	" 15·0
"	"		5th	"	" 48·0
"	"		4th	"	" 120·0
"	"		3d	"	" 340·0
"	"		2d	"	" 960·0
"	"		1st	"	" 2,700·0

The most interesting result, however, of these measurements is the determination of the periods of the variable stars, and the intensity of their light at different periods. The first astronomer who noticed a variable star was Fabricius, in 1596; he saw a star, in the constellation *Cetus* entirely disappear, while Holwarde, in Franeker (Netherlands), discovered that there was a regular periodicity in its reappearance, and that its period was 331 days and 20 hours. It is the most remarkable of all periodic stars, as the intensity of its light during this time varies from 1,000 to 1 or 0, showing for about two weeks as a star of the second magnitude, decreasing for three months, remaining invisible for five