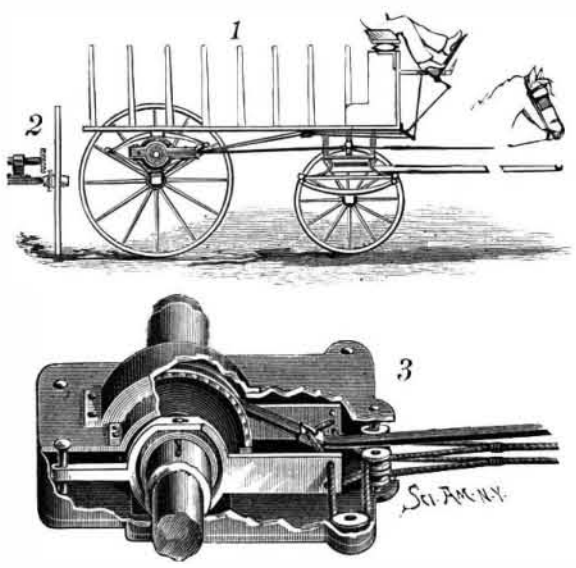
A DEVICE TO STOP RUNAWAY HORSES.

The illustration represents a device, applicable to any kind of a vehicle, for stopping runaway horses, or speedily arresting vicious or frightened animals that are uncontrollable by the ordinary appliances. A revoluble sleeve is mounted in bearings on the rear axle, with which the sleeve is in alignment, and centrally on the axle is mounted a sheet metal casing, a view of which, partly broken away, is shown in Fig. 3. The sleeve is extended through the side walls of the casing, and a pulley is centrally secured thereon, with radial flanges having ratchet teeth on their edges. Within the sleeve two shafts are made to fit revolubly, their inner ends nearly touching each other, while the outer end of each has a gear wheel with laterally projecting teeth, held near to but not in connection with a similar toothed wheel on the inner end of each hub of the axle, as shown in Fig. 2. In connection with a hub on each sleeve on either side of the central pulley is placed a laterally apertured lever, these levers having a rocking engagement with standing bolts near the rear end of the casing, and being connected at their forward ends with cords leading to a rocking lever pivotally supported on the foot board, as shown in Fig. 1. These side levers within the casing are so arranged, in connection with the sleeve and the two shafts within it, that the vibrations of the lever on the foot board by the driver will throw the gear wheels on the outer end of each shaft into connection with the similar wheels on the wheel hubs, and also cause the central pulley to revolve rearwardly. A substantial band, preferably of leather, is secured around the central pulley, and extends forwardly, its extremity having lateral straps attached to it and also to the bits of the horses, so that the revolution of the pulley in a direction away from the horses will shorten the band and pull the heads of the horses downward and rearward in a forcible manner, throwing the horses upon their haunches and



ZALUD'S HORSE ARRESTER.

quickly arresting their forward movement. Provision is also made for automatically locking the central pulley, so that the tension on the horses will not be removed if they back up, when it is desired to retain a team of fractious horses with their heads trammeled, this pressure being readily removed by the driver pressing with his foot on the treadle. The device is applicable to one-horse as well as two-horse vehicles.

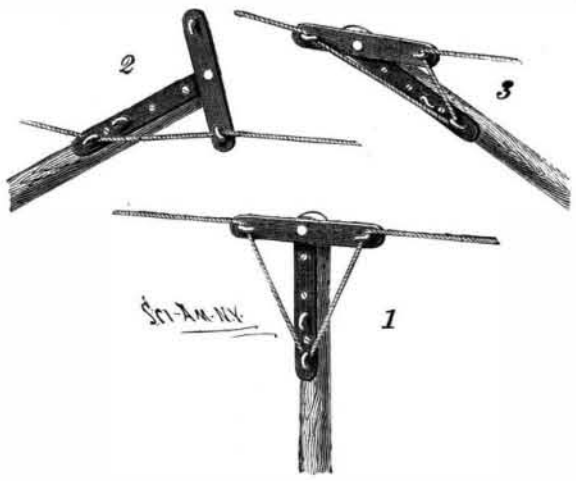
This invention has been patented by Mr. Albert Zalud, No. 150 Bunker Street, Chicago, Ill.

Ancient Egyptian Glue and Veneering.

Among the many occupations of the carpenter, that of veneering is noticed in the sculptures of Thebes, as early as the time of the third Thothmes, whom I suppose to be the Pharaoh of the Exodus, and the application of a piece of rare wood of a red color to a yellow plank of sycamore, or other ordinary kind, is clearly pointed out. And in order to show that the yellow wood is of inferior quality, the workman is represented to have fixed his adz carelessly in a block of the same color while engaged in applying them together. Near him are some of his tools, with a box or small chest, made of inlaid and veneered wood, of various hues, and in the same part of the shop are two other men, one of whom is employed in grinding something with a stone on a slab, and the other in spreading glue with a brush. It might, perhaps, be conjectured that varnish was intended to be here represented, but the appearance of the pot on the fire, the piece of glue with its concave fracture, and the workman before mentioned applying the two pieces of wood together, satisfactorily decide the question, and attest the invention of glue 3,800 years ago.—*J. G. Wilkinson.*

NOVEL CLOTHES LINE SUPPORT.

A very simple and effective device for supporting and tightening a clothes line is shown in three positions in the engraving. Fig. 1 shows the prop and stretcher in engagement with the line. Fig. 2 shows the first step



McCLAUGHRY'S CLOTHES LINE PROP AND STRETCHER.

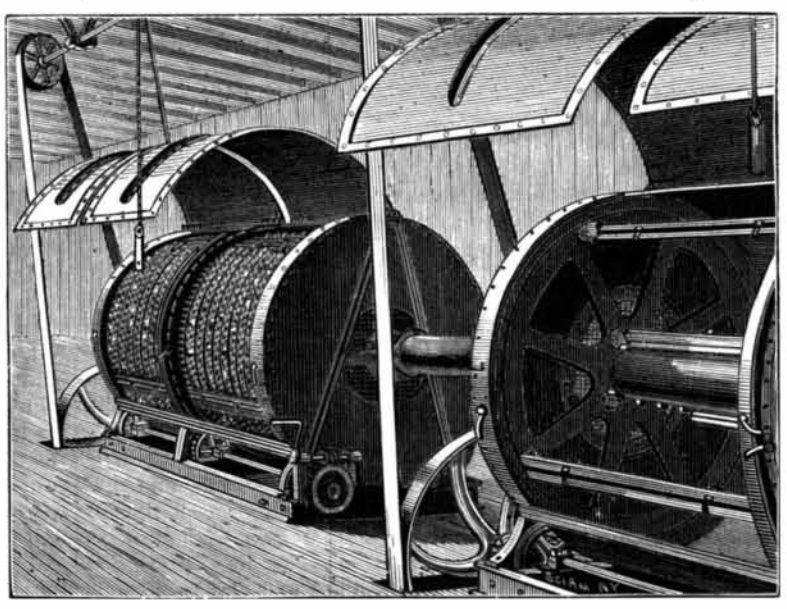
in the application of the device to the line, and Fig. 3 illustrates the second step in the operation.

To the prop pole at one end is attached an oblong metallic plate furnished with one or two hooks curved toward the opposite end of the pole. To the outer extremity of the plate is pivoted a bar having at opposite ends curved hooks which project inwardly toward the center of the bar.

The manner of applying the prop to the line is illustrated by Fig. 3. One of the hooks on the fixed plate is brought into engagement with the line, then one of the hooks on the pivoted bar is passed under the line as shown. Then the other hook on the pivoted bar is brought into engagement with the line as shown in Fig. 3. Finally the pole is straightened up, giving the line the desired amount of tension, at the same time supporting it so as to prevent undue sagging. A patent for this invention was recently granted to Mr. C. C. McClaughry, of Joliet, Ill.

A DRYING APPARATUS FOR FISH, ETC.

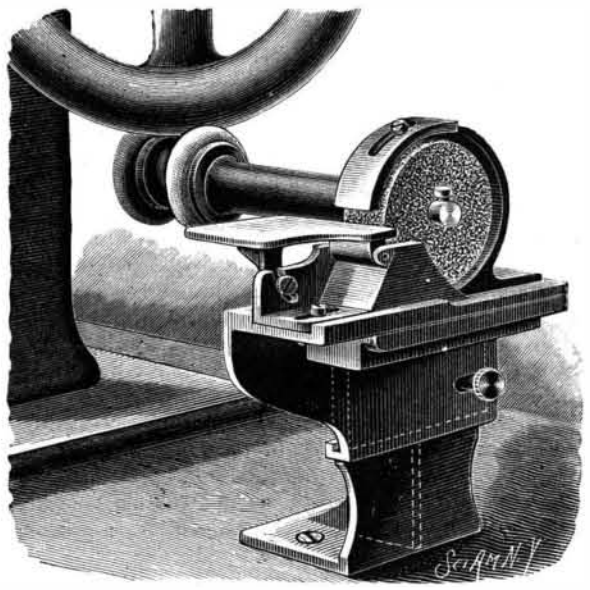
Our illustration represents a drying apparatus in which a blast of heated air in employed in connection with revolving reticulated wire frames or baskets carrying the material to be dried, the particular construction shown being used in drying fish, but the apparatus being also adapted for drying tea, wool, fruit, etc. It is a patented invention of Mr. Edward Robinson, of St. Johns, Newfoundland. The material to be dried is operated upon within a stationary cylinder or cylinder casing, in which is a central tube, through which heated air is forced by a pressure blower or fan, the tube having downwardly opening nozzles, through which the heated air passes to the interior of the cylinder. The fish are held in a series of wire net wheels or disks, arranged parallel with one another throughout the length of the cylinder, each of these disks being constructed to form a hollow wire-work box or basket. As shown in the engraving, radial divisions are made in these disks, each division occupying one-fourth of the transverse area of the cylinder. These divisions or sections are attached to longitudinal T-irons extending the whole length of the cylinder, the baskets in sets of four, thus making a species of wheels, any number of which, at suitable distances apart, are arranged in the cylinder. These wheels are connected by the T-irons with circular open-work frames or heads, one being in the middle of the series and another at each end, and together constituting a revolving frame. Doors or lids are provided for the insertion and removal of the reticulated boxes or baskets from the cylinders, our illustration showing the lids of these cylinders raised as for the purpose of filling and discharging fish, one of the cylinders being filled with fish frames ready for work. Instead of being stationary, the cylinder itself may, if desired, be made to revolve and rotate the basket-like disks. The frame of circular heads and T-irons, which is the carrier of the disks or receptacles, may be supported on rollers beneath the circular heads, or in any other suitable manner, rotary motion being then imparted by any convenient arrangement of gearing. For the drying of tea the skeleton frames require to be of finer texture or mesh, with means for maintaining the tea in motion, while for drying wool the frames should be of large capacity, with various other modifications in detail for different articles.



ROBINSON'S APPARATUS FOR DRYING FISH AND OTHER ARTICLES.

AN IMPROVED GRINDING DEVICE.

The illustration represents a convenient attachment which may be readily placed to receive motion and power from a sewing machine for the sharpening of scissors, sewing machine needles, and similar light articles. It has been patented by Mr. John S. Pyper, of Au Sable Chasm, N. Y. The attachment as shown is secured on the sewing machine table, but with a slight variation, that is provided for in the patent, may be clamped on the hand or balance wheel guard plate. The upright portion of the bracket stand screwed to the table has a horizontal flanged guide plate integral with its upper outer face, the flanges of this guide plate interlocking with hooked flanges on a sliding bed plate with an integral platen, carrying the grinding mechanism. The bed plate is adjustably secured to the guide plate by a set screw bolt, whereby the relative position of the parts on it may be adjusted with regard to the rim of a sewing machine balance wheel. Upon the bed plate is a wheel case, one side of which is open, and from the other side an integral sleeve projects horizontally, the bore of the sleeve being adapted to afford revoluble support to a shaft, on one end of which,



PYPER'S GRINDING ATTACHMENT FOR SEWING MACHINES.

within the wheel case, is a grinding wheel, while on its other end are friction wheels. The friction wheels are duplicate, being integral radial enlargements on a hub, and having their peripheral edges grooved for the reception of elastic bands, whereby they will readily engage the peripheral surface of a balance wheel rim. Upon the upper surface of the platen are parallel guide ribs, between which a dust guard and rest plate support is adjustably located, the plate being slotted to permit the frame to be moved toward or from the wheel face and adjustably secured where desired by a screw bolt. The platen is also apertured below the forward face of the grinding wheel for the escape of dust into a drawer supported in position to slide on the under side of the platen, there being also a dust guard above to direct the products of attrition to the drawer. Upon an upright longitudinal bracket flange is supported the rest or rocking table, whereon the scissor blades are held and brought into contact with the revolving face of the wheel. This table may be given any desired degree of inclination, so that the blades may have their edges properly beveled when supported on the table and brought into contact with the moving face of the grinding wheel. To shield the hands of the operator from accidental contact with the face of the revolving grinding wheel, an adjustable guard plate is attached to the rim of the wheel case, whereby only a small portion of the surface of the grinding wheel need be exposed.

JAPAN'S literary welfare is looked after by 475 newspapers, magazines, etc. Tokio alone boasts of sixteen daily newspapers. It is imperative that each officer of the government should subscribe to the government organ "Kwampo."

The Holley Memorial.

The memorial to be erected in this city in honor of Alexander Lyman Holley is so far advanced as to assure its completion before the time appointed for its public dedication, which is to take place early in October, during the New York meeting of the British Iron and Steel Institute. The site fixed for the memorial by the park commissioners is an admirable one, in Washington Square, and there, of course, the ceremony of unveiling the bust will take place; but the commemorative address of the occasion will be delivered before the open air ceremony, in Chickering Hall, which has been engaged by the Institute of Mining Engineers for all the sessions of both societies in this city. This is a wise arrangement. The delivery of an address out of doors is, under all circumstances, an unsatisfactory business for the audience as well as the orator. In the daytime, and in the midst of the traffic and bustle of a metropolis, it would be more than usually laborious and ineffective.

The joint committee of the civil, mechanical, and mining engineers having this matter in charge has invited Mr. James Dredge, editor of London *Engineering*, to deliver the address, and it is understood that he has accepted the appointment. A better choice certainly could not have been made. Mr. Dredge will bring to this congenial task a thorough acquaintance with the history of progress in those branches of engineering science which Holley so greatly advanced and so brilliantly adorned. It has been his business as a technical journalist to note the successive steps of their wonderful advance, and to measure the achievements of the individual leaders as well as the conquests of the armies they have directed and inspired. The theme is a grand one, for it so happens that the period and the sphere of Holley's professional career present developments unequaled for far-reaching effects by any other quarter of a century or any other departments of human industry since civilization began.

It was in this period, and in the domain of mechanical engineering (in its widest sense), that all the great inventions of the preceding century suddenly came to full harvest. Railways, stationary and marine steam engines, high explosives and heavy artillery and armor, and above all the manufacture of steel on a vast scale as a structural material, all burst into bloom and fruit, revolutionizing the conditions of commerce, industry, and war, and inaugurating a new era, in which for the first time, whatever pessimists or agitators may say, the dominant tendencies are for peace, the rewards of labor are steadily increasing, and the world, which had previously produced little more than would feed and clothe its inhabitants, is making all civilized nations rich.

But besides the ability to grasp this great subject, and the critical perception of its relations to the individual career which he is called more particularly to characterize, Mr. Dredge possesses a qualification which renders him a welcome as well as competent orator for this occasion. No one who knew Holley could fail to know that James Dredge was one of his most loyal and well-beloved friends. It was at the house of Mr. Dredge that he was nursed back to life from the first attack of the disease which after another year proved fatal.

The occasion is an international one. The memorial itself is a testimony from engineers of both hemispheres. Its dedication will be graced with the presence of hundreds of guests from beyond sea. We Americans have had other opportunities to express our appreciation of the character and career of our great countryman. What voice could now be more fitly heard than that of an Englishman, who is a distinguished engineer, a critic of authority, and who was Holley's friend?—*R. W. R., Engineering and Mining Journal.*

Japanese Vegetable Paper.

This paper is manufactured largely in Japan from the bast fibers of *Wickstrœmia canescens*, a shrub which grows widely over the middle and southern parts of the country, and belongs to the family Thymelaeaceæ. This bast paper—used in the home country for a great number of purposes, such as bandages, etc.—possesses an astonishing tenacity and flexibility, combining the softness of silk paper with the cohesion of a woven fabric; it is so thin that the finest writing can be read through it, yet it is torn only with great difficulty.

Commercially the paper is known in Japan as usego; as put upon the market it has a uniform yellowish-white color and a silky luster. It is made in pieces 20 inches long by 14 wide, weighing about 30 grains, and yielding when burned about 1 per cent of an ash containing alumina, oxides of iron and calcium. Examined under the microscope it is seen to consist of a thick network of cross and transverse thread-like bast fiber cells with extraordinarily thin walls.

The attention of Dr. Hoffmann was first drawn to the use of the paper in medicine by a traveled patient, who during the recent influenza epidemic was accustomed to take powders wrapped up in the paper; he had himself thought of the method, and had long adopted it. The author says (*Therap. Monats.*), "This method appeared to me to have so many and so considerable advantages over the now customary enveloping (of powders) in wafers and capsules, that I took occasion to invite its trial and initiation in wider circles."

The wrapping up of a powder is simple enough; it is placed on a piece of the paper, say of four square inches surface, and shaken or moved into the center. The four corners are now taken up, brought together over the powder, and twisted between the first finger and thumb into a little cord, care being taken to avoid direct pressure of the little packet, as well as all unnecessary crumpling of the paper. In this way a paper packet is obtained similar in form to the toy known as a "banger." With a pair of scissors the "cord" is now cut up as close as possible to the packet, leaving of course as much of the twisted column as is sufficient to keep the paper together. By the compression of the scissors in cutting, the latter is the more tightly held together.

If, for the sake of experiment, the packet thus prepared is unfolded, it will be found that for wrapping a powder of say 8 grains, a piece of paper about as large as a crown and weighing about ¼ of a grain is used. In the process the powder is also much compressed, so that, for example, an antipyrin powder of 8 grains occupies a volume scarcely exceeding that of a pea.

The powder thus simply enveloped is quite ready to be taken; it is laid on the tongue and swallowed with a mouthful of water. Arrived in the stomach it unfolds immediately, the medicament is set free and readily absorbed.

That this does occur may be simply shown as follows: If a powder thus wrapped is thrown into water, the twisted end untwists in a few seconds, the packet opens like a bud, and the contents are taken up by the water. The same conclusion was also reached by physiological experiment, benzoic acid taken into the stomach enveloped in Japan paper being distinctly traceable half an hour after in the urine as hippuric acid. By this means it was proved that the vehicle did not delay the absorption of the remedy.

Sympathetic Inks.

In answer to frequent inquiries, we give herewith the modes of preparation of a number of sympathetic inks:

INKS THAT APPEAR THROUGH HEAT.

1. Write with a concentrated solution of caustic potash. The writing will appear when the paper is submitted to strong heat.

2. Write with a solution of hydrochlorate of ammonia, in the proportion of 15 parts to 100. The writing will appear when the paper is heated by holding it over a stove, or by passing a hot smoothing iron over it.

3. A weak solution of nitrate of copper gives an invisible writing, which becomes red through heat.

4. A very dilute solution of perchloride of copper gives invisible characters that become yellow through heat.

5. A slightly alcoholic solution of bromide of copper gives perfectly invisible characters which are made apparent by a gentle heat, and which disappear again through cold.

6. Write upon rose colored paper with a solution of chloride of cobalt. The invisible writing will become blue through heat and will disappear on cooling.

7. Write with a solution of sulphuric acid. The characters will appear in black through heat. This ink has the disadvantage of destroying the paper.

8. Write with lemon, onion, leek, cabbage, or artichoke juice. Characters written with these juices become very visible when the paper is heated.

INKS THAT APPEAR UNDER THE INFLUENCE OF LIGHT.

9. Chloride of gold serves for forming characters that appear only as long as the paper is exposed to daylight, say for an hour at least.

10. Write with a solution made by dissolving one part of nitrate of silver in 1,000 parts of distilled water. When submitted to daylight, the writing appears of a slate color or tawny brown.

INKS APPEARING THROUGH REAGENTS.

11. If writing be done with a solution of acetate of lead in distilled water, the characters will appear in black upon passing a solution of an alkaline sulphuret over the paper.

12. Characters written with a very weak solution of chloride of gold will become dark brown upon passing a solution of perchloride of tin over them.

13. Characters written with a solution of gallic acid in water will become black through a solution of sulphate of iron, and brown through the alkalies.

14. Upon writing on paper that contains but little sizing with a very clear solution of starch, and submitting the dry characters to the vapor of iodine, or passing over them a weak solution of iodide of potassium, the writing becomes blue, and disappears under the action of a solution of hyposulphite of soda in the proportions of 1 to 1,000.

15. Characters written with a ten per cent solution of nitrate of protoxide of mercury become black when the paper is moistened with liquid ammonia, orange red with a solution of, and gray through heat.

16. Characters written with a weak solution of the soluble chloride of platinum or iridium become black when the paper is submitted to mercurial vapor. This ink may be used for marking linen. It is indelible.—*Les Inventions Nouvelles.*

A New Expedition to the North Pole.

The London *Times* gives some details of the new expedition to the North Pole, for which the Norwegian National Assembly voted 200,000 kroner on June 30, and which will be under the charge of M. Nansen. Hitherto, with one possible exception, all attempts to reach the North Pole have been made in defiance of the obstacles of nature. It has been an open campaign between the endurance of man and the icy barrier of the Arctic Seas, in which nature has always been triumphant. On this occasion a systematic and well organized attempt will be made to ascertain if nature herself has not supplied a means of solving the difficulty, and if there is not, after all, a possibility of reaching the North Pole by utilizing certain natural facilities in these frozen seas of which all earlier explorers were ignorant. The circumstances on which these new hopes are founded may be thus summarized. The Jeannette expedition of 1879–81 and the loss of that vessel seemed to sound the knell of all expeditions to reach the Pole by Behring Straits; but in the end the results of that effort are shown to have been more satisfactory and auspicious than any of the officers of the Jeannette could have hoped for when, with extreme difficulty, they succeeded in reaching Siberia across the ice from their wrecked vessel. In June, 1884, exactly three years after the Jeannette sank, there were found near Julianshaab, in Greenland, several articles which had belonged to the Jeannette and been abandoned at the time of its wreck by the crew, and which had been carried to the coast of Greenland, from the opposite side of the Polar Sea, on a piece of ice. This fact at once aroused curiosity as to how it accomplished the journey across the Arctic Ocean, and as to what unknown current had borne the message from Behring Straits to Greenland. However these objects reached Julianshaab, they could not have come in an eastern direction, through Smith's Sound, for the only current which reaches Julianshaab is that from the eastern coast of Greenland *via* Cape Farewell and the north. Nor is there much probability that they were borne in a western direction from the place where the Jeannette sank, for all the currents round Nova Zembla, Franz Josef Land, and Spitzbergen are known, and it seems impossible for the ice bearing the relics of the unfortunate Jeannette to have traversed the intervening distance in the space of three years, even if it were possible at all. There remains only the alternative that there is a comparatively short and direct route across the Arctic Ocean by way of the North Pole, and that nature herself has supplied a means of communication, however uncertain, across it. Increased significance to the discovery of the Jeannette relics in 1884 was given by the identification in 1886 of bows found on the coast of Greenland with those by the Eskimo in the vicinity of Behring Straits, at Port Clarence, Norton Sound, and the mouth of the Yukon River. M. Nansen's expedition will endeavor to realize these hopes of a direct route across the apex of the Arctic Ocean. A specially constructed boat of 170 tons will be built, and provisions and fuel taken for five years, although it is hoped that two will suffice. The expedition will consist of ten or twelve men, and M. Nansen proposes to leave Norway in February, 1892.

Valuable Points by a Plumber.

"If you want a point or two about cleaning waste pipes without sending for a plumber," said a retired member of the fraternity to a New York *Telegram* reporter, who was complaining of the trials of house ownership, "just listen to me. If I were still in the business I would not give away what I am going to tell you now, but as I am out of it I do not see why I may not help a friend. One of the most frequent and trying annoyances," he continued, "is the obstruction to the free, quick outlet of the waste water of the wash basin, the bath tub, and kitchen sink. This is caused by a gradual accumulation of small bits of refuse material, paper, rags, meat bone, or grease, which check and finally entirely stop the outflow of the waste, and then the plumber is called to remove the stoppage with his force pump. Sometimes this is accomplished, but often the pipe bits to be cut, and there is great inconvenience and expense. Just before retiring at night, pour into the clogged pipe enough liquid soda lye to fill the 'trap,' as it is called—or the bent part of the pipe just below the outlet. Be sure that no water runs into it until the next morning. During the night the lye will convert all the offal into soft soap, and the first current of water in the morning will wash it away and leave the pipe as clean as new. See? This is practical chemistry, yet few chemists would ever think of it."

Photographing in Colors.

Experiments with a view to photographing in permanent colors were made by Herschel in 1840, by Becquerel from 1847 to 1855, and by N. de St. Victor from 1851 to 1866; but without a coating of varnish the colors thus obtained faded within a couple of days at the longest. Now, Herr Franz Veress, of Klausenburg, Transylvania, has discovered a process to produce very brilliant colors that, according to *Iron*, have so far stood the test of a three weeks' exposure to ordinary daylight without suffering any change. The photographs were exhibited during a lecture delivered before the Society for the Propagation of Natural Sciences, as well as in the Photographic Institute of Vienna, but not yet exposed to the direct sunlight. The photographs are upon glass and upon paper. The former are diapositives, and, if looked through, show for the most part a ruby red ground color, with a picture in bright, sometimes brilliant, colors, from the deepest hue of ruby red—far deeper than the ground color—to light orange, with several shades of red and yellow, and from violet to aniline blue and the intensest, most brilliant blue. The same colors prevail also on the paper positives, which have all a grayish brown ground color, upon which the red inclines more to purple than ruby, and the violet is especially brilliant. Green is missing on all positives. Examination through a magnifying glass fails to detect any impurities in the pigment of the colors or vagueness in the contours of the pictures, and each color stands out from the other with striking distinctness. It is not known whether the colors are a real pigment or the effect of thin layers. The sensitive preparation is a silver chloride emulsion in collodion or in gelatine, and the solution, the preparation of which is the inventor's secret, is poured upon the glass or the paper, where it soon takes a brownish red color. The plate is put into a copying frame, and exposed to the rays from a transparent colored drawing, of which the negative picture is soon visible. The exposure has to last in the case of glass negatives two or three hours, and in case of paper at least three days, as the colors come out very slowly, but the picture having been fixed in an alkaline bath, the colors become brighter and more intense. The process in the camera would require an exposure lasting several weeks, but the latest improvements have greatly lessened the time of this kind of exposure only, especially for the paper negatives. The invention is believed to rest on a modification of the process described by H. Carey Lea some two years ago, of applying the photo chlorides of silver in the form of an emulsion.

The Tricentenary of the Microscope.

The magnifying power of lenses is a discovery whose origin is lost in the darkness of ages. Layard found a convex lens in the ruins of Nimrod's palace, and there would seem to be no doubt that the very delicate work of the ancient lapidaries owed its remarkable perfection to optical arrangements of greater or less simplicity that permitted of magnifying the apparent size of the objects worked.

Roger Bacon made known the magnifying power of segments of spherical glass, and a short time afterward appeared the double opera glass, the invention of which is attributed to an Italian optician. But it was not till 1590 that the idea of combining lenses and of constructing a microscope, properly so called, was realized for the first time. This invention is due to Hans Zansz or Jansen and his son Zacharias, both manufacturers of double opera glasses at Middelburg, Holland.

The year 1890 therefore corresponds to the tricentenary of this important invention, and the population of Anvers has decided to celebrate this historic date by organizing an international microscopical exhibition in which will figure the ancient apparatus, those of intermediate epochs, and the most improved modern ones. This is a project of great scientific interest, and we can only express the sincerest wishes for its realization and success.—*La Nature.*

PAINT spots may be removed from wood by covering them with a thick coating of lime and soda. Wash off after twenty-four hours.

A MACHINE TO SUPERSEDE TYPESETTING.

In the SCIENTIFIC AMERICAN of March 9, 1889, appeared an illustration and description of a machine then being successfully operated in the New York *Tribune* office, and which superseded all typesetting in the ordinary way, as heretofore done by hand. The accompanying engraving represents the same machine, but with important improvements and modifications which have since then been made. The machine is constructed after the patents of Ottmar Mergenthaler, now controlled by the Mergenthaler Printing Company, of New York City, and is styled the linotype machine, because it casts lines or type blocks, as shown in the small view herewith, to be used instead of individual

A LINOTYPE, OR TYPE BLOCK OF ONE LINE.

types set up and "spaced" to make the required measure. To form these lines a matrix is necessary for each letter or character, these matrices being assembled in the proper order by operating a series of finger keys like those of the typewriter.

In the improved machine the matrices, instead of being held, as formerly, in vertical tubes just above the keyboard, one tube for each different letter or character, are contained in the channels of a magazine formed of properly grooved top and bottom plates, set at a little distance above the keyboard, and inclined toward it at an angle of about forty-five degrees.

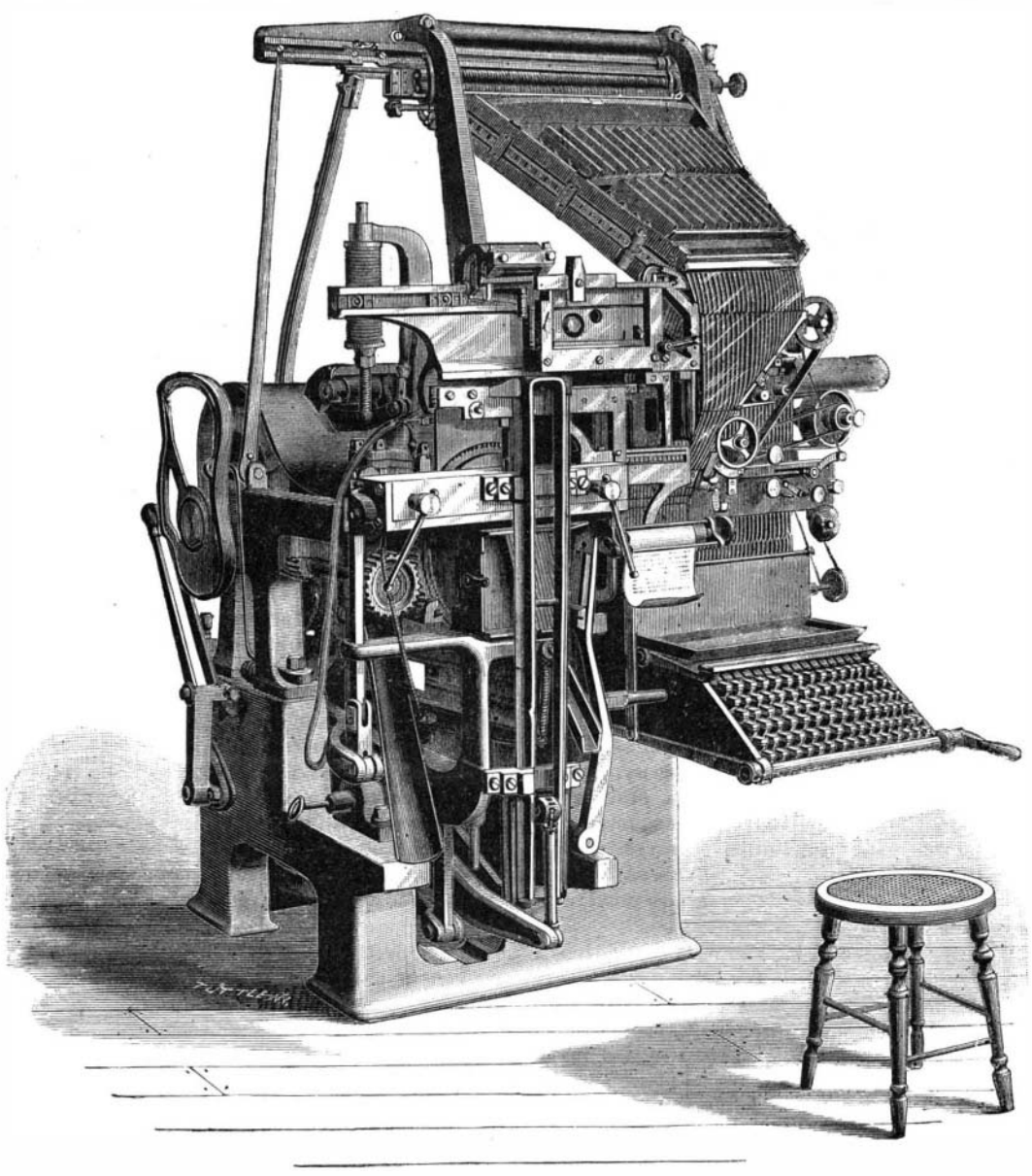
The matrices are flat pieces of brass, on the edge of which is the female die for forming its proper letter, and for each touch on one of the keys a single matrix drops from its inclined magazine down a vertical or nearly vertical chute to the point of assembling. The arrangement is such that no air blast is needed, as in the former machine, to bring the matrix quickly to its proper place in the formation of the line. To increase the speed of the matrices that are not in direct line vertically with the place of assembling, the vertical chutes at one side are made of gradually diminished length, the bottoms of the chutes of the chute section thus forming a sharp incline, just below which, and at a corresponding inclination, is a fast-running belt. In this way the matrices the farthest off come into position as quickly as those which are nearest, and there is no danger of transposition of the letters when the machine is worked at its highest speed. There is also a great advantage in the arrangement of the magazine with the grooved plates, instead of separate tubes, as heretofore, for, by making proportionate flanges on the sides of the matrices, one set of magazine plates can be used for matrices representing several different sizes of type, and the work of changing the machine from one size to another is but slight.

The work of "spacing" is essentially unchanged. The spaces are simply long, tapering wedges, dropped in their proper places by the operator in the same manner as a letter would be in the formation of a line, and, when it is seen that the line will take no more of the text, a simple touch of a lever pushes all the wedges simultaneously enough further in to make a perfect "justification," in which there is no possibility of uneven spacing. Thence the line of matrices, properly clamped, is taken automatically to a pot of metal automatically kept at the proper temperature, substantially as heretofore described, the type block is cast and deposited in proper order with its predecessors, and the matrices themselves taken to a distributing device at the top of the magazine, to the proper places in which they are returned, the whole work being done automatically. A great improvement in the direction of simplicity and positiveness of action has been effected in the distributing device, and the whole machine is much less complicated than formerly. To a person of sufficient intelligence it must be as easy to "learn to set type" with this machine as to acquire facility in operating a typewriter.

Much as printers generally are inclined to be skeptical as to the practicability of any typesetting machine in actual work, it is hardly possible to observe the operation of this machine without being convinced that, for ordinary composition, it is a remarkable success. A compositor will ordinarily compose or "set up" 1,000 to 1,200 ems an hour, and it requires one-third of his time in addition thereto to "distribute" his type, or put them back in the case. This machine performs both operations simultaneously, and at a speed equal to that of a typewriter. One but ordinarily expert in typewriting can readily write from thirty to forty words a minute, and, to illustrate the amount of composition accomplished at different rates of speed, a table has been prepared by an expert printer, from which it appears that

20	words a minute	equals	3,158	ems an	hour.
25	"	"	"	3,947	"	"
30	"	"	"	4,737	"	"
35	"	"	"	5,526	"	"
40	"	"	"	6,316	"	"
45	"	"	"	7,105	"	"
50	"	"	"	7,894	"	"
55	"	"	"	8,784	"	"
60	"	"	"	9,474	"	"

It is said that the machine can be run at the rate of 10,000 ems an hour, if the operator can work the keys fast enough, although from 5,000 to 6,000 ems an hour has been found to be about the highest practical speed thus far. The work is cleaner and much less tiresome than typesetting by hand, and to learn it is but the task of only a few hours. The machine in its old form has been for a considerable time in successful use in several large daily newspaper offices, in different sections of the country, and its importance has been recognized and is appreciated by the International Typographical Union, which directs practical printers to run the machines in all offices within its jurisdiction where they are used. The President of the New York Typographical Union, after witnessing recently a trial of the new machine, writes: "I conclude that the acme of perfection in a typesetting machine has been reached."



THE LINOTYPE MACHINE, TO SUPERSEDE TYPESETTING.

A New Gas Detector.

Spongy platinum, as is well known, glows in a mixture of combustible gas and air; but hitherto no convenient arrangement has been devised for utilizing this reaction. H. N. Warren proposes to saturate asbestos yarn with a saturated solution of platinum oxalate, and then ignite it in a platinum crucible. This prepared yarn when heated to 80° F. becomes incandescent in an atmosphere containing 0·5 per cent of coal gas by volume, and by arranging it by the side of the wick of an ordinary spirit lamp, it is easy, by lighting for a short time, to raise the temperature of the yarn to the requisite temperature, so that when the lamp is blown out it will become incandescent if there is any escape of coal gas in the neighborhood.