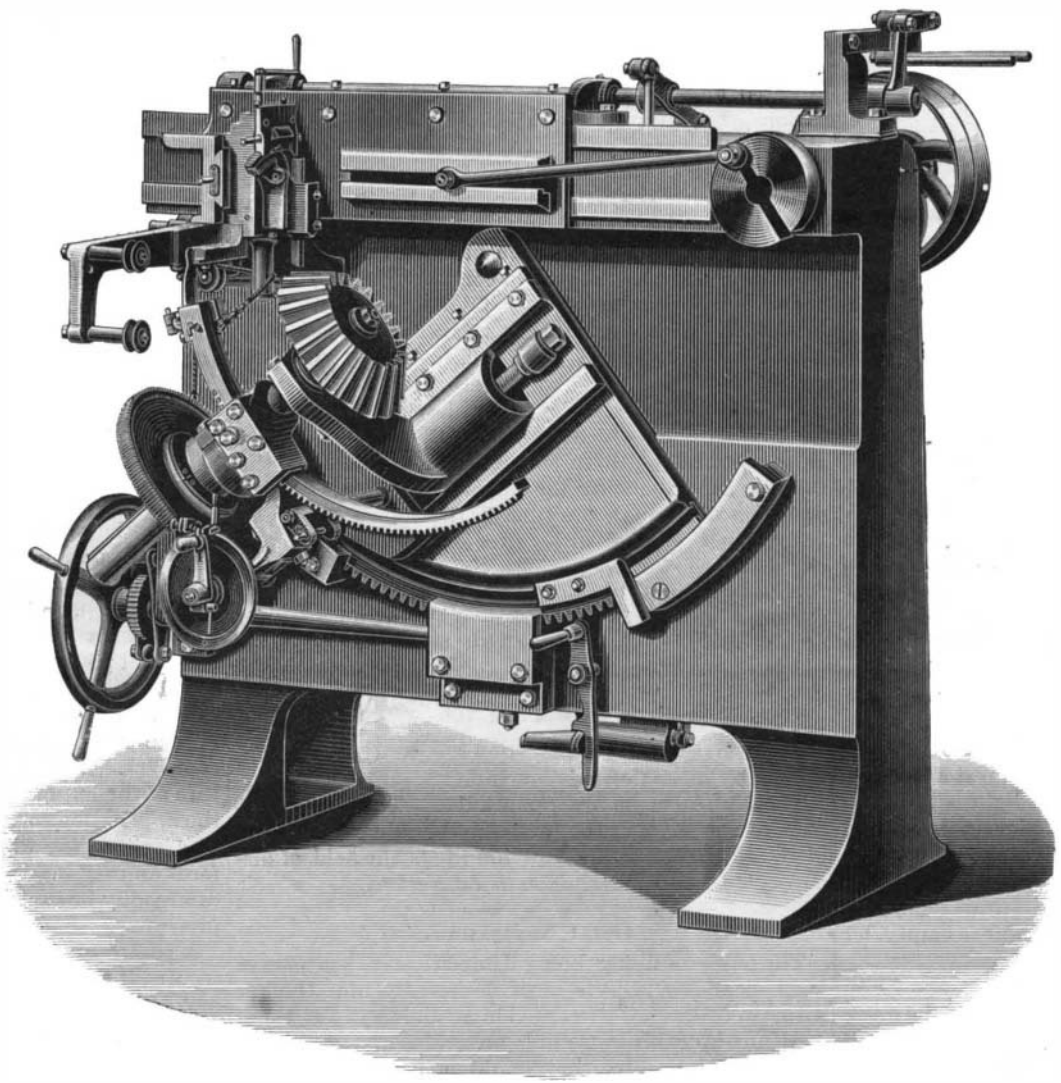
Grips and Brakes for Brooklyn Bridge.

The Committee on Mechanical Appliances have reported to the Bridge Trustees that they have now examined 39 grips, 5 cable lifters, and 26 signal, brake, and grip plans. They have given authority to Mr. George Westinghouse, of Pittsburg, to try his compressed air system on the bridge. He is to bear all the expense of getting up a brake and power to work the present grip, except that the Trustees will make the connections with the cars on the bridge. Mr. Westinghouse is now preparing to fit up a train of four cars with reservoirs of compressed air and the necessary machinery to work the present grips and brakes by one person only, in the same manner as locomotive engineers now control the air brakes on railway trains. Having inspected in all about 113 projects and inventions, the committee have ended their examinations.

BEVEL WHEEL SHAPING AND DIVIDING MACHINE.

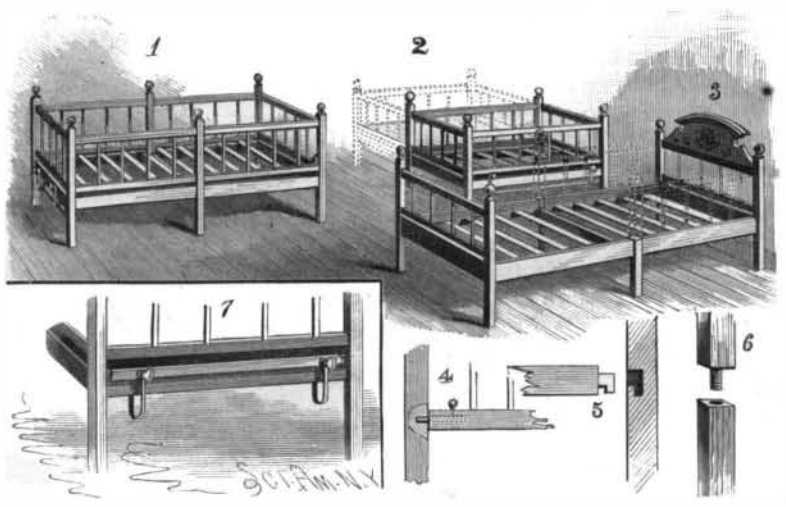
We illustrate a bevel wheel shaping and dividing machine to cut wheels up to 18 inches in diameter, constructed by Greenwood & Batley, of Leeds, and described in *Engineering*. It is designed to shape the teeth under the guidance of a copy or former, four or five times the size of the desired tooth. The tool is held in a box carried by a reciprocating slide, like the slide of a shaping machine, and has a stroke of about 5 inches. The wheel or bank is mounted on a spindle, the nose of which is covered, and fitted with a steel mandrel to receive it. The spindle is carried on two bearings, of which the upper can be moved in a slide by a screw to adjust the wheel. The other bearing is a long socket, and is itself carried by a bearing on a segmental plate capable of rotation about a point toward which the cutting edge of the tool always travels. The spindle can be moved endwise by the upper bearing to set the blank in the first instance, and can be rotated by a worm and wheel on the lower socket. Attached to this same socket is a curved radial lever, carrying at its extreme end the copy or former, which is kept in contact with a steel guide plate by means of a weight having a cord passing over guide pulleys. The spindle and all its adjustments are carried on the segmental plate, and can be moved by means of a worm and toothed sector to feed the blank toward the tool. This latter travels always in the same straight line toward the apex of the imaginary pitch cone of the wheel, and has no feed motion. The blank is moved in two directions; it is raised toward the tool by the rotation of the sector, and at the same time it is rotated on its axis through a very small angle by the "former" sliding over the guide plate. The cutting pressure of the tool tends to hold the "former" and the plate together. When the tool has reached the bottom of the tooth, the catch motion shown at the lower part of the machine comes into play, and throws off the strap. The attendant then winds back the toothed sector, rotates the blank through the required angle, and sets the machine in action again.



BEVEL WHEEL SHAPING AND DIVIDING MACHINE.

AN ADJUSTABLE CRIB AND BEDSTEAD.

The invention herewith illustrated covers a form of adjustable bedstead and crib for children which is simple in construction, but admits of being arranged in several different ways to suit the convenience of a family. Figs. 1 and 3 represent the dimensions of a full-size bed, the former without a head piece, and the latter, as well as Fig. 2, showing in dotted lines its modified forms as a simple or double crib. Fig. 4 shows a simple spring catch by which the end pieces are held perpendicularly in the uprights, and Fig. 5 represents the ordinary manner of holding the side and end pieces in the posts. Fig. 6 illustrates the manner of securing the uprights in the center posts for holding the side pieces and cross divisions, and Fig. 7 represents a cover tucking attachment. The latter may be applied to both sides and ends, and is a variety of goose-necked piece of spring metal, screwed to the bottom side of the cross and end pieces in such way that, by means of thumb screws, a horizontal piece of thin slat is made to firmly bind the cover. In fitting the bed for a double crib, only one mattress and the usual blankets, quilts, etc., are needed, the cross piece being easily raised for adjusting the bedding, and then fitting closely over it, tucking in the children. When the children are too large to use the cribs, the cross piece can be removed from the center part and the bed can be used lengthwise, the sides remaining to form a protection if desired.



JENKENS'S ADJUSTABLE CRIB AND BEDSTEAD.

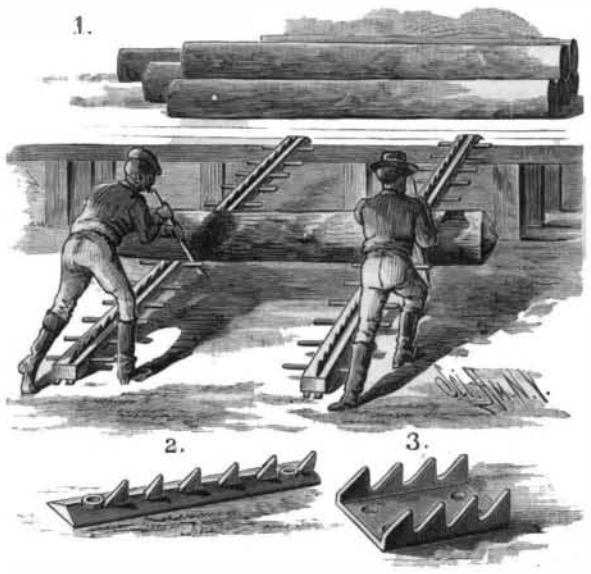
This invention has been patented by Mr. C. A. Jenkens, of New Berne, N. C.

Progress of the Statue of Liberty.

The pedestal for Bartholdi's great statue has now been completed. The last piece of stone has been put in place, and the last of the large iron girders to which the statue will be fastened is ready for duty. When completed, the statue will look even grander at night than in the daytime, as its electric illumination will give the figure greater prominence. It is proposed to place four large lights at the base of the statue, one at each corner of the pedestal, and a powerful shaft light on the torch, so arranged that its beams will shoot high into the heavens. The lights at the base will be so placed as to illuminate the statue and bring the figure into bold relief on the darkest night. The light of the torch will be 300 feet above water, and should be visible for about twenty-five miles at sea.

SPIKED SKID.

The accompanying engraving represents a skid used for handling logs and heavy timber. The skid is provided with one or more ridges or rows of saw-tooth-like projections upon its upper surface, and with a series of horizontal pins, which serve as fulcrums for the hand spikes by which the logs are moved. The teeth are formed of iron or steel plates, different forms being shown in Figs. 2 and 3. It is apparent that these teeth prevent the logs from slipping or rolling backward. By the use of these skids, heavy logs can be easily moved from one level to a higher. The log cannot slip back, and not only are time and labor thereby economized, but the workman is given a chance to rest whenever necessary.



POLLEYS' SPIKED SKID.

This invention has been patented by Mr. William H. Polleys, of Neillsville, Wis.

Long Distance Gas Transportation.

In a paper upon the long distance transportation of natural gas, Mr. Thos. P. Roberts has expounded, before the members of the Engineers' Society of Western Pennsylvania, certain views which may be briefly summarized as the advocacy of exhaustion instead of forcing as the means of propelling gas through mains. The author depends greatly upon the example of English mine ventilation, by which in some cases a furnace, and in others a fan, draws a current of air through perhaps 40 miles of workings. He refers to the formulæ given in text-books concerning the delivery of air and gases under pressure, to show that friction is always provided for; so that when forcing any expansive fluid has to be resorted to, there is a limit to the length of the circulating system (which may be ascertained by computation) beyond which the fluid will not flow. On the principle of exhaustion, however (which means the progressive reduction of density of the contents of a pipe as it is prolonged from its inlet to the outlet where the exhausting apparatus is situated), Mr. Roberts declares he knows of nothing to stop the onward course of a gas when it has "an inclosed passage continually opening before it." On the other hand, he states that at a certain rolling mill several years ago, the 6 inch gas main proved insufficient for the required supply. Pumping at the supply end was resorted to, and several attempts resulted in failure. Finally, a special Cameron pump made for the purpose was tried. This pump had a 40 inch plunger and 4 feet stroke. It took the gas at the supply end at 30 pounds pressure; and, although in desperation the pump was driven at 250 revolutions per minute, the gas at the delivery end never rose above 15 pounds pressure—thus losing half the pressure in transit, notwithstanding the great compression at the inlet end. Mr. Roberts was unable to say whether the engineers "changed ends" with their pump, and if so, with what results.

To prevent a strong solution of potash from crystallizing, dilute by the addition of water.

Industrial Education.

An exhibition has recently been held in New York city, under the auspices of the Industrial Education Association, which has brought the subject of the manual training of young people more prominently before public attention than any amount of pamphlet literature could possibly have done, for by showing what the children have already accomplished, the possibilities of the future are conclusively demonstrated.

The exhibit was made up of individual contributions and of collections sent from the different industrial schools throughout the country. They included every department of labor—drawing, modeling, wood and metal working, repousse and leather work, printing, embroidery, sewing, and even plain cooking. Competition for the prizes was limited to pupils under fifteen years of age and to those living within twenty miles of New York. Many of the most complete educational exhibits, however, came from cities at some distance, those from the industrial schools of Philadelphia, Chicago, Worcester, St. Louis, New Haven, and Cleveland being particularly attractive. They illustrated the different steps in manual education, and showed a thorough systematizing that promises the most gratifying results for the future. The New York public schools were not very well represented, but the exhibits from many of the private institutions were worthy of thoughtful study. This was particularly the case in the display of mechanical and engineering models.

Few men of the present untrained generation could compete with these boys of fifteen years and under, in the accuracy and finish of their work. The Gramercy Park Industrial School exhibited a very fine model of a suspension bridge, made from full sized drawings at a scale of one-sixteenth of an inch to the foot. This was the work of seven boys, all under fifteen, and secured the first prize. A very perfect little model of a stone-cutting machine, made by one of the pupils of the Amateur Technical Union, and designed to show the manner of dressing marble, sandstone, and other of the softer building stones, was awarded the second prize in this department. The exhibits of the Hebrew Technical Institute and the Yonkers public schools also contained much that was ingenious in the way of models and mechanical toys. The exhibition was open for a week, and was witnessed by at least 7,000 persons. The bulk of the unsold contributions has been transferred to the training school of the Industrial Association, and will form the nucleus of a permanent exhibition. Arrangements have already been made for similar exhibitions in several neighboring cities. It is confidently believed that this movement for the manual training of American citizens, which has pushed its way in the face of so much opposition and indifference, is now established on a firm foundation, and by making industrial education a recognized feature in our public school system, will give us a generation of skilled native workmen.

Useful Hints for Horse Owners.

Horses are very delicate and liable to many ailments, and persons owning them, who are not very familiar with their nature and requirements, will find the following suggestions, condensed from an article in the Cincinnati *Enquirer*, useful:

Never feed a horse with hay from a rack located above his head, as a draught beats down which is injurious, and the dust is liable to injure the eyes.

A horse should not be overworked, for, like man, he gets tired, and to keep in good condition, he should have rest and good bedding.

Sometimes a horse will not eat his usual food. A mash of oatmeal, milk warm, is about the best food to give a horse under such circumstances. And then a horse should have grass. It is his natural food. A continual diet of hay hardens the coating of his stomach. The food is not digested. Carbonic acid gas is generated, and the horse dies in agony, swelling up, suffering from what is commonly known as colic. Then, again, horses need well ventilated stables, free from draught or damp. The floor should be smooth and nearly level. It should be well drained and light, for sudden change from darkness to light is trying to the eyes, and a damp, offensive odor is injurious. Then, again, the bedding and litter should be carefully separated from that which is foul. They should be well shaken up and dried, and the stall should be thoroughly cleansed; and when the stable is empty, let in a plenty of fresh air.

A horse's stall should be large enough to allow him to lie down comfortably in any position. A tired horse will be glad to lie down with his legs stretched out if he has room; but if you can't give him a loose box, then a light halter block should be used, and care taken to arrange the halter so that it may travel freely to allow the head to come easily to the litter, for rest and sleep are as necessary as food and water.

If a horse comes to the stable wet, he should be rubbed dry before the blanket is put on. If he is standing about in the cold, it should be put on. The legs should be rubbed, and the hoofs always examined for stones.

SMOKE CONDENSED BY MEANS OF ELECTRICITY.

(*Continued from first page.*)

The experiments of Mr. Lodge are of that class which will in time become classical, and which should be made public. It was with this object that the two devices illustrated (Figs. 1 and 2) were constructed. The larger apparatus is designed to show the effect of electricity upon smoke in motion (Fig. 1). It is provided with a furnace, in which may be burned the materials for producing the smoke. The fumes first pass into a box having glass sides, which enable us to see what is going on inside. This is connected with another box of the same kind by means of a horizontal glass tube. The second box has a tube at its top and a device for regulating the draught. Each of the boxes in its opposite sides is provided with brass combs, which are connected with the opposite poles of a Toepler-Voss, a Ramsden, or Holtz electrical machine.

German tinder, for instance, is put into the furnace. The thick smoke which it produces passes through the whole apparatus. If the electrical machine is now put in motion until the sparks pass between the combs, immediately the smoke becomes agitated, and in a little while will disappear by condensation. The boxes and tube become as transparent as before the experiment.

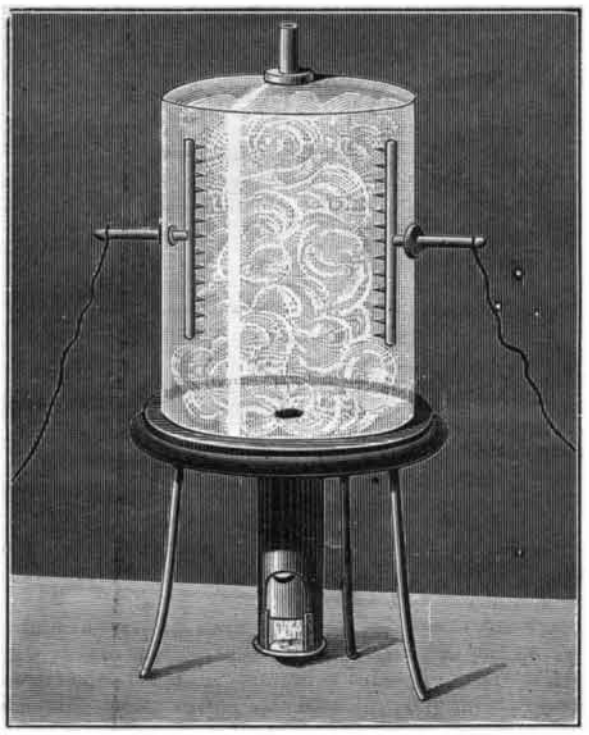


Fig. 2.—SMALL APPARATUS FOR CONDENSING SMOKE BY ELECTRICITY.

The smoke of German tinder can be advantageously replaced by that which is produced by the combination of hydrochloric acid and ammonia. The white thick smoke of hydrochlorate of ammonia condenses very rapidly on the electrified combs.

The smaller apparatus (Fig. 2) is much more practicable for experiment. It shows the effect of electricity on smoke at rest, and gives a clear idea of the phenomenon.

It consists in a glass cylinder having openings in its side, through which are passed the metallic combs. It is mounted on three feet, and is provided with the furnace for producing the smoke. The draught is maintained through the tube in the top of the chamber. Paper treated with niter or German tinder is burned in the furnace, or else the vapors upon which the experiment is to be made are liberated by some chemical reaction. When the glass cylinder is full of smoke, the machine connected with the combs is put in motion, and the vase, smoky and cloudy, immediately becomes clear and transparent, the vapors being condensed.

Tobacco smoke is very quickly and easily condensed by means of this machine.

These phenomena are remarkable. They appeal at once to the savant, the artisan, the student of hygiene, and demonstrate how infinite is the field of discovery.—*Gaston Tissandier, in La Nature.*

Aerial Navigation.

The power of flying, being denied to man, has always been one of the objects most desired by him, though hitherto he has not succeeded in attaining it. If there were any large birds feeding on grains and possessing strong flying powers, they would no doubt have been domesticated long since, and made subservient to man's use, like horses and other animals. But, unfortunately, all large birds possessing strong wing power are carnivorous and untamable, so we shall have to rest content with terrestrial locomotion till we have succeeded in solving the mechanical problem of propelling and steering balloons. We are still a long distance from this result, and it is at least very doubtful whether it will ever be attained.

The difficulty lies in the small specific gravity or density of the air, which demands on the one hand very large vessels, and consequently large surfaces, in order to obtain sufficient buoyancy to lift even small weights, while on the other hand it affords only a slight resistance to the propelling mechanism. A submerged torpedo boat has a cross section which is in a moderate ratio to the area of the propeller, but in a balloon the cross section on which the air acts is enormously large in proportion to the area of any propeller which can be applied. Even ships have difficulty in moving against currents, although only submerged to a small extent, but in balloons the difficulty becomes so great that we are afraid it will not be overcome until we have discovered a material combining the strength of steel with the specific weight of air.

The partial success which attended the trial of the Krebs-Renard balloon, which ascended at Meudon in August, 1884, and proved navigable in a quiescent atmosphere, but failed completely when there was a little wind, seems to have stimulated the other votaries of aeronautics. We hear from Berlin that another dirigible balloon is being constructed there by M. Ganswindt, its inventor. The object is to secure, by means of great size, capacity for carrying power and a swiftness exceeding the strongest wind, so that the balloon shall remain steerable. The speed the balloon is expected to attain is 45 to 50 feet per second. Its dimensions are: Length, 150 meters; diameter, 15 meters; contents, 18,000 cubic meters. The weight will be 430 cwt. It is stated, says the *Mechanical World*, from which the above is copied, that the inventor has already received an offer of £10,000 for his patent, and the editor adds, "which we should certainly accept if we were in his place, as after trying the balloon we should be afraid not to receive any further offers."

Rare Metals.

The necessity for minute accuracy in chemical analysis has just been illustrated in an important discovery by Dr. Strohecker, of Frankfort. Somewhat extensive diluvial deposits of brick clay exist at Hainstadt, near Seeligenstadt. The bricks made from this clay vary considerably in color, according to the temperature at which they are burnt, but the cause of the variation has never before been suspected. It now appears that the layers of this clay are singularly rich in several metals hitherto very scarce, particularly cerium, glucinum, lanthanum, didymium, and yttrium. The first two of these metals are present in such quantities that a more abundant supply may be expected. Ceria, in the form of hydrate, constituted 9·4 and 13·4 per cent of the clay in two layers analyzed, and the color of the bricks seems to be mainly determined by its presence, for the quantity of iron present was very small. The discovery is therefore of immediate value, and will doubtless lead to further researches on the elements, which may prove to have much more importance in the economy of nature than has been supposed. It is evident that we must not neglect these little known elements, for, apart from their scientific interest, we cannot tell what undiscovered uses may lie in them. We do not know, indeed, whether they are really as scarce as has been supposed.

COMBINED TRUSS AND SUPPORTER.

The principal feature of the improvement herewith illustrated is the combination of an abdominal supporter with a rupture pad acting independently of the abdominal supporter and having a decidedly inward and upward pressure. Thus the abdominal supporter relieves the ruptured parts from all undue pressure arising from the weight of the abdomen, and the rupture pad has only to hold the small portion of the intestines affected by the rupture, for which a very light pressure by the pad is sufficient. Another feature of the improvement is the application to the pad of a coil spring which affords an easy inward and upward pressure, and which can readily be exchanged for one of lighter or stronger pressure.

SHULZ'S COMBINED TRUSS AND SUPPORTER.

A patent for this invention has recently been issued to Mr. Henry A. Shulz, of Brooklyn, N. Y. Further particulars will be furnished by the Smith Truss Company, 25 Temple Court Building, New York city.

Detection of Minute Traces of Color.

Interesting experiments have been made by E. L. Nichols on the quantity of coloring matter which must be mixed with a perfectly white powder (carbonate of magnesia) before the human eye can detect it. From these experiments it appears that red and yellow are most easily detected, 16 and 17 parts respectively being sufficient for detection when mixed with one hundred million parts of white powder.