

IMPROVED DRILLING MACHINE FOR BOILERS.

To insure satisfactory results in the manufacture of steam boilers for high working pressure it is generally stipulated that all holes in the plates shall be drilled, and not punched or reamed, and that the bent or curved portions of the boiler shall be drilled after being bent. The holes in the flat portions of the boiler are readily dealt with in vertical or horizontal drilling machines with single or multiple spindles, but the curved portions, such as the barrel and flanged corners of the fire box shell of a locomotive boiler, require special treatment, and the machine which is illustrated below has therefore been devised.

It will be seen that the boiler shell, after being completely built and tacked together with a few service bolts, is placed horizontally in the machine, and there held by suitable screw apparatus. The upper half is then operated upon by the several drills; and afterward the boiler is moved half way round, and the holes in the remaining portion drilled, thus completing the work with only one shift of the job. It is obvious that this method of drilling insures absolute coincidence of the rivet holes, a matter the importance of which needs no comment; and, although several machines have been devised for the simultaneous action of several drills upon one and the same job, we do not know of any one which—to the same extent as the machine illustrated—combines this qualification with such com-

spindles by means of endless leather bands and bevel gearing, tension apparatus being fitted to each drilling headstock for always keeping the band tight, and friction clutches for applying and suspending the rotation of each spindle independently. An independent self-acting feed motion by screw and differential gear is provided for each spindle, and a quick hand traverse in and out. The machine illustrated has six drill spindles, but this number may be varied according to requirements.

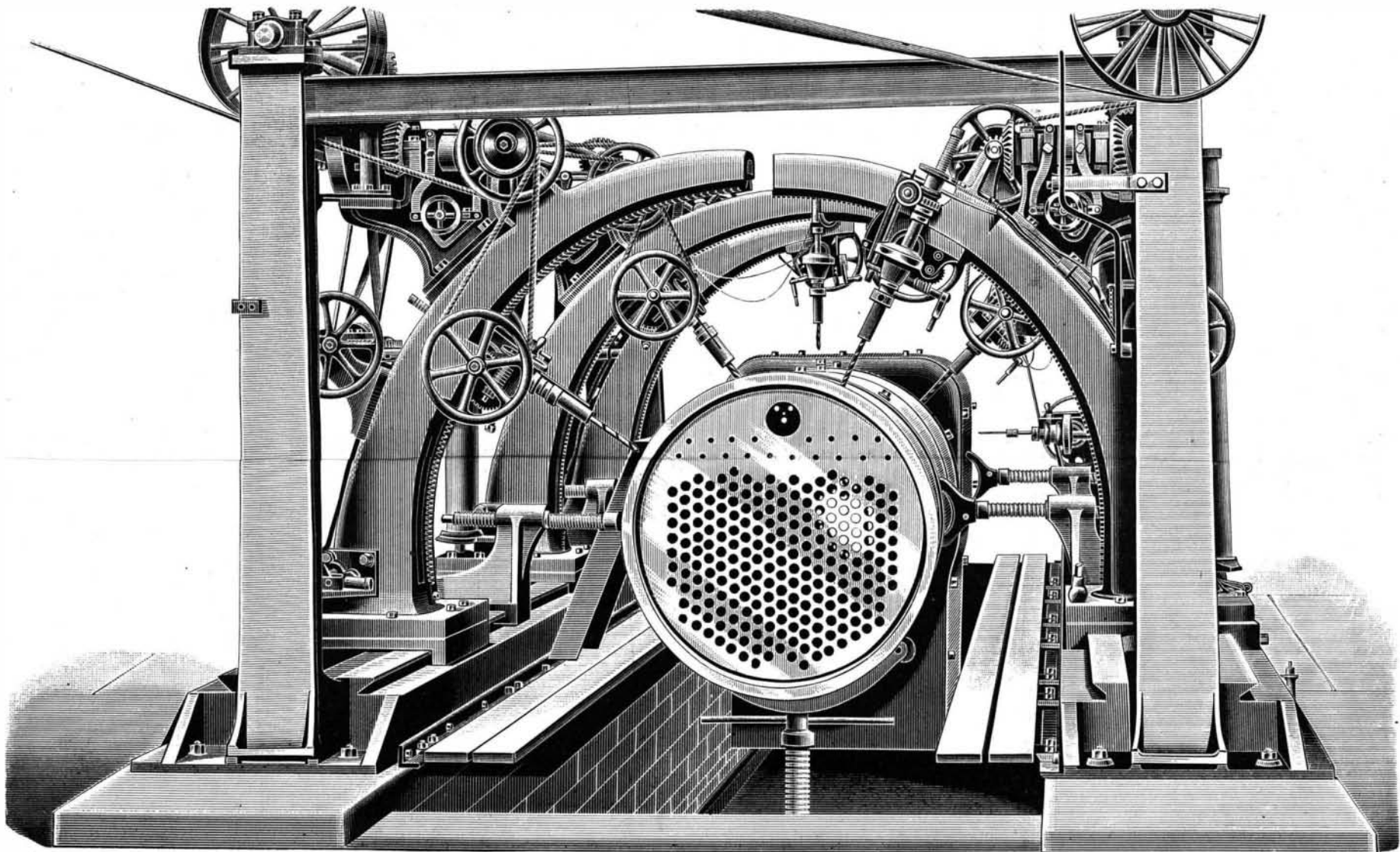
Abuse of the Stomach.

Different constitutions have peculiarities in regard to the way in which they assimilate food, and the old adage that what is one man's meat is another's poison is a very true one, says the *Popular Science Monthly*. There is no ailment more common in middle life and in old age than indigestion. This, of course, depends upon improper food taken too frequently and in undue quantity. As a rule, the victim of indigestion flies to medicines for relief, or to one of the thousand-and-one quack remedies that are advertised to cure everything. How much more rational would it be to alter the diet and to give the stomach the food for which it is craving? If the stomach could talk, I can imagine it, after pills and gin and bitters and quack remedies of every description have been poured into it, begging to be relieved of such

is restored by nature. The bulk of our people are free from inherited prejudices against the different medical schools. But we can well appreciate the system of medicine which does not make the human system a storehouse for bad-smelling drugs and takes the least of its own medicine. We can also appreciate the medical association which was the first to accord to women all the advantages of men in giving diplomas. You give to woman her rights as to education and the practice of medicine. We give her the rights of citizenship, and have no taxation without representation. Go thou, learned doctors, to your homes and do likewise. Colorado offers pure air and magnificent scenery. We have rock-walled, dark canons and lofty, snow-capped mountains. Our springs offer medicine for many complaints, and are as varied as the odors from ambrosial nectar to all the combined smells of famous Cologne. Our railroads will carry you from the deepest canons to the top of Pike's Peak—nearer heaven, perhaps, than some of you will ever reach by any other means. Colorado is all before you. You may choose your place to rest, with Providence as your guide."—*The Hahnemannian Monthly*.

Blood Clotting Explained.

Recently, before the Physiological Society, Berlin, Dr. Lilienfeld gave an account of his researches on the clotting of blood. He had succeeded in separating Al-



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pletely independent and universal action of the drill spindles.

The *Engineer*, London, to which we are indebted for our illustration and the particulars here given, says the machine has been designed and patented by Mr. C. M. Davies, M.I.M.E., and recently constructed by Messrs. Hulse & Co., Ordsal Works, Manchester, for Messrs. Dubs & Co., of the Glasgow Locomotive Works—where it is now in full operation. It has two horizontal slide beds, placed respectively on opposite sides of a pit, with vertical standards carrying the self-contained countershafting attached to the ends of each.

In the beds are racks by means of which the several drilling headstocks may be traversed by hand and power in either direction for quickly adjusting the drills in lines parallel with the axis of the boiler. Fitted to the beds are sliding saddles with circular tee slides on their upper surfaces, affording radial adjustment to the drill spindles in horizontal lines. Segmental arms surmount the saddles, and are fitted with spindle slides adjustable radially thereon by curved racks. The spindles are thus made to point always to the axis of boiler when drilling the horizontal and circular seams of the barrel, but there is yet another adjustment provided for each spindle, namely, a vertical radial adjustment, enabling it to drill holes in various planes parallel to each other, as in rectangular fire boxes, or at angles with each other, as in curved fire boxes. Rotary motion is transmitted from the countershaft to the drill

horrors and saying, "Give me a little rest and a cup of beef tea and a biscuit, and go and take a little fresh air and exercise yourself." Instead of this, the miserable organ has to be dosed with all sorts of horrible concoctions in the way of drugs, brandies and sodas, and champagne, to endeavor to stimulate it to action. There is no doubt that the stomach that requires stimulants and potions to enable it to act efficiently can hardly be said to be in a healthy state; or can long continue to do its work properly. The digestive organs, unfortunately, are the first to sympathize with any mental worry. They are like a barometer, and indicate the errors of malnutrition and its consequences. The healthy action of every organ depends on the proper assimilation of the food taken. As soon as the digestive process fails everything fails, and ill health results, with all its disastrous concomitants.

American Institute of Homeopathy.

The homeopathic doctors of America held a jubilee meeting at Denver, Col., commencing June 14. In the evening Governor Waite and Mayor Van Horn welcomed the members. Governor Waite said:

"It is my pleasant duty, as governor of the State, to welcome you to Colorado. There is a peculiar propriety that the governor of such a State as this should extend to you cordial greetings, because Colorado is one grand sanitarium and offers life to invalids, to whom health

Schmidt's fibrinogen into two substances, "thrombosin" and an albumose. The former unites with calcium and forms fibrin, while the albumose retards clotting. The separation of fibrinogen into these two constituents may be brought about by means of acetic acid, nuclein, nucleic acid, and other substances. Blood clotting, accordingly, consists in a disintegration of leucocytes, setting free nuclein; the latter then decomposes the fibrinogen, and enables the thrombosin to unite with the calcium salts of the blood. While the blood is circulating in the body it contains no free nuclein in solution, and hence clotting is impossible. The speaker further considered that peptones (albumose) and leech extract prevent clotting by themselves uniting with the calcium of the blood, and thus preventing its union with thrombosin.

A FRENCHMAN, M. Bersier, has devised a plan by which the compass performs the part of the helmsman. An electric current is placed to work on the desired course, and when the vessel gets off the course for which the electrical instrument is set, the current starts a motor in either direction and moves the rudder until the vessel returns to her proper course. A two months' trial of the apparatus is reported to have resulted very successfully. Among the advantages of this new method is greater accuracy and no loss of distance in a run of twenty-four hours, as is usually allowed for ordinary steering by hand.

How the Chinese Make India Ink.

After many unsuccessful efforts to worm the secret of the manufacture of India ink out of the Chinese, science is finally to have the last say upon this product of the Celestial Empire.

Gunpowder, porcelain, crackle-china, green indigo, and, in fact, all the very ancient Chinese products have been unveiled to us by science only; and it is science again that is to teach us how the Chinese manufacture their celebrated ink. The following is a brief *resume* of the interesting researches, crowned with success, that Mr. Dagron has made upon this subject.

It has always been thought up to the present that the Chinese manufacture their ink by grinding a special lampblack, unknown to Europeans, with a suitable mucilage discovered by them, and that the paste obtained is allowed to dry slowly like their porcelain. The light that has just been thrown upon this subject is due to the progress that has been made in microscopic studies in recent years. In fact, upon submitting a very dilute solution of the most celebrated India ink to an examination by a very powerful microscope, it has been discovered that the particles of carbon forming the basis of the ink are of a uniform diameter. Upon repeating such examination with inferior or counterfeit India inks, it is observed that the particles of carbon are of very variable and sometimes even disproportionate diameters.

Upon submitting to such control all the numerous varieties of lampblacks, it is found that none possesses this regularity of the atoms. The blacks that most closely approach it are those that have been comminuted during the manufacture and the lightest portions selected. Nevertheless, the diameters of these are still more irregular than in India ink.

This first point established, a second remained to be fixed. Is the mucilage employed by the Chinese simple or compound? Thanksto the principle established by Mr. C. Kœcklin, and mentioned by Mr. Schutzenberger in his *Traité des Matières Colorantes*, we know that two mucilages of opposite nature reciprocally thin one another upon being mixed, and in proceeding by elimination, after analysis, we find that the compound mucilage employed by the Chinese unites in itself about the extremest thinness of the Kœcklin principle.

An India ink having been prepared according to these data, in a state of solution, and left at rest for one or more months and then decanted, it was observed that the particles of carbon more and more closely resembled those of the genuine India ink. Upon afterward allowing this liquid ink to concentrate and evaporate in a vacuum, there is finally obtained a plastic substance which, when dried, has all the characters of the best India ink. It was of interest, from a theoretical standpoint, to ascertain this latter fact; but, in ordinary practice, it seems to be much simpler and more rational to leave the ink in a liquid state than to form it into a stick, that it would be necessary later on to redissolve with some trouble.

This liquid ink has the same properties as the best quality of India ink in sticks, and serves for the same purposes, such as making drawings and washes.—*Le Genie Civil*.

The Treatment of Hiccough with Snuff.

In the *Journal des Praticiens* for May 5 (*Lyon Medical* for May 20), M. Tatevossow relates a case in which he successfully combated diaphragmatic spasm, accompanied by cough or prolonged paroxysms, by making the patient take snuff until sneezing set in. Its action was immediate, the paroxysm ceased, and the continued use of the snuff caused the disease to disappear. This, it is remarked, is an extenuating circumstance in favor of snuff that the societies against the abuse of tobacco might take into account in their proceedings.—*N. Y. Med. Jour.*

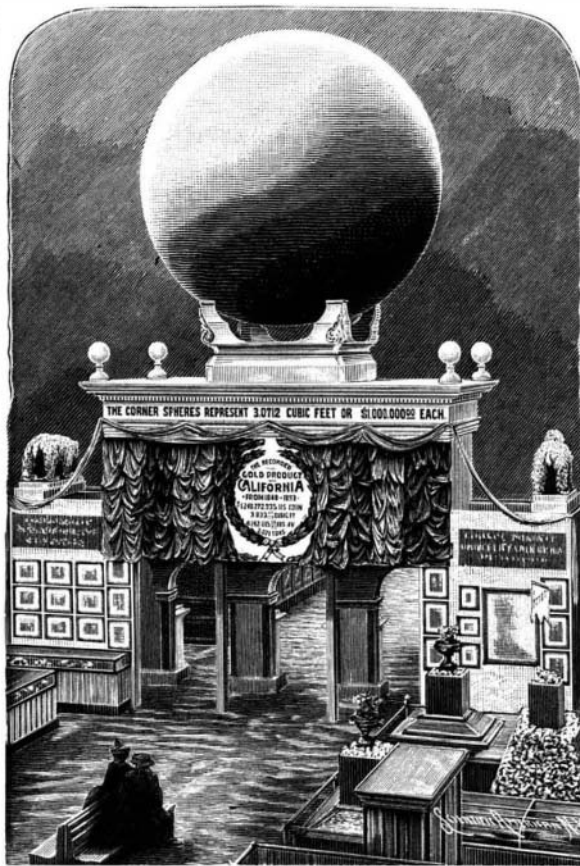
An Effervescent Purgative Lemonade.

The *Journal des Praticiens* gives the following formula, by Dr. Constantin Paul, who recommends it on account of its rapid action (in two or three hours) and its being tolerated: Sodium phosphate, 375 grains; distilled water, 8 ounces; sirup, 1 ounce; tincture of lemon,

25 drops; citric acid and sodium bicarbonate, each, $\frac{1}{2}$ drachm.

NOTES ON THE MIDWINTER FAIR.

The Midwinter Fair, like the Columbian Exposition, has passed into history, and California may be con-



GILDED BALL SHOWING GOLD PRODUCT OF CALIFORNIA.

gratulated on carrying the great enterprise to a successful termination. California made the most extensive display of any of the States at the Columbian Exposition, Illinois, perhaps, excepted. The mineral resources and the vegetable productions of California, as exhibited in the two fairs, were a revelation to the Easterner.

A conspicuous object in the Mechanical Arts building of the Midwinter Fair was a huge gilded ball, which is shown in our illustration, made from photographs taken by Mr. A. W. Cornwall. This large globe, which surmounts the pavilion of the College of Mining of the University of California, was intended as one of those great object lessons which appeal to the eye and are remembered long after the dry statistics have been forgotten. The ball showed the total recorded gold product of California from 1848 to 1893, representing \$1,248,272,935 in United States coin, a weight of 2,071 tons, and a bulk of 3,833 cubic feet.

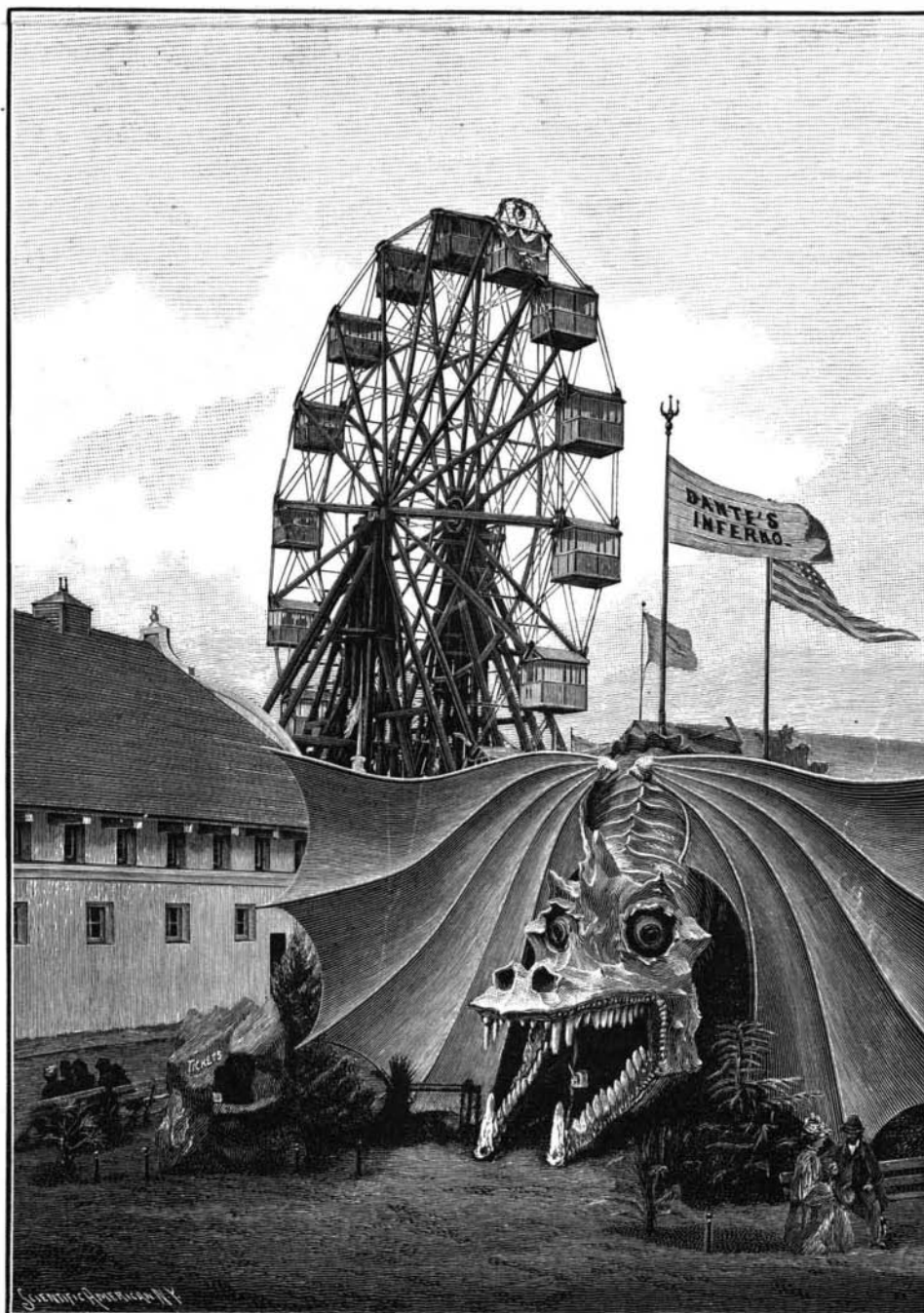
The small globes at the corners represented 3,0712 cubic feet of the precious metal, value \$1,000,000. This is not the only globe representing the amount of gold mined, for Nevada County exhibited a ball which showed the total gold product of the county as \$205,000,000.

After looking at the ball for a few minutes, the visitor gained some knowledge of where the present wealth of California sprang, and was doubtless glad to reach the open air, where there was less chance to indulge in day dreams on the potentiality of riches. The Firth wheel at the Midwinter Fair afforded a magnificent bird's eye view of the entire coast, including San Francisco Bay, the Golden Gate, the Pacific, and the ranges of wooded hills surrounding Concert Valley. At its foot a dazzling panorama was spread out. Owing to the elevation of the grounds, the highest line of vision is 305 feet above the Pacific. The wheel is 100 feet in diameter, which added to the height of the platform and the site carried visitors about 150 feet over the average level of the grounds. The total weight of the wheel and its sixteen cars was 192,000 pounds. The steel shaft weighed 18,000 pounds. The total capacity of the cars was 160 passengers. The towers which supported the wheel weighed 800,000 pounds. The method of propulsion was entirely different from that employed in the Ferris wheel, a cable system being employed in place of cogs. The wheel was driven by a reversing engine of 200 horse power. About twenty minutes were occupied by the trip. At night the wheel was brilliantly illuminated with incandescent lights.

Near the wheel is seen the huge dragon whose fiery eyes and yawning mouth were a terror of little folks. A huge hollow rock at the left formed a ticket office. A touter or "barker" dressed in the costume of Mephistopheles called attention to the wonders and horrors of Dante's Inferno.

Fire Caused by Electric Lamps.

Fire occurred in the business portion of Victoria, B. C., on the 5th ult. Fortunately the loss was only \$15,000, and the records would show the origin "unknown," but for experiments made after the fire was extinguished. In the upper story of a dry goods house, several thirty-two candle power incandescent lights were installed. One of the lights was connected with a long insulated wire, and several feet of spare wire allowed the moving of the light from one portion of the room to another. Through ignorance or carelessness, the globe was laid on a pile of goods. The fire occurred shortly after the light was turned on at the power house, which goes to prove that the globe was placed on the goods during the day. The tests were made in the room where the fire originated, and were reported in the *Victoria Times* as follows: "There is no longer the slightest doubt as to how the fire started, as two tests have shown that the incandescent light will ignite cloth. Last evening, in the presence of Mr. Hutcheson, Chief Deasy, representatives of the *Times*, and a few others, a child's woolen hood was tied around the 32-candle light, the latter having been turned for ten minutes previously. Steam came from the wool almost immediately, and then smoke. At the end of eight minutes the hood was on fire and the globe burst. A similar test was made the evening before, and the cloth ignited in six minutes. Wool is the least inflammable of fabrics, and the test last evening was as severe as could be desired. All danger in this connection can very easily be avoided, either by hanging the globes free from anything that will take fire or by placing guards around them."—*Fire and Water*.



FIRTH WHEEL AND THE DRAGON AT THE MIDWINTER FAIR.