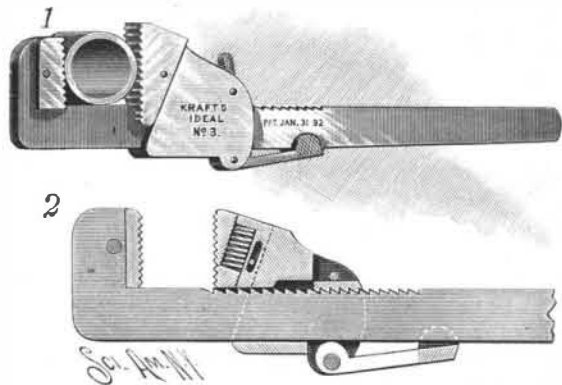


AN IMPROVED WRENCH.

The illustration represents a simple and durable wrench, patented by Mr. Charles H. F. Kraft, in which the jaws may be quickly and conveniently adjusted for different sized work. Fig. 1 shows the tool in perspective and Fig. 2 is a side sectional view. The fixed jaw on the outer end of the handle consists of a U-shaped removable piece held in position by a pin, and the movable jaw is mounted to slide on an inclined tongue of a head held longitudinally adjustable on the wrench handle, and adapted to be locked on it. The jaw is wedge-shaped, and in moving it in or out in its guide-ways it moves nearer to or farther from the fixed jaw.

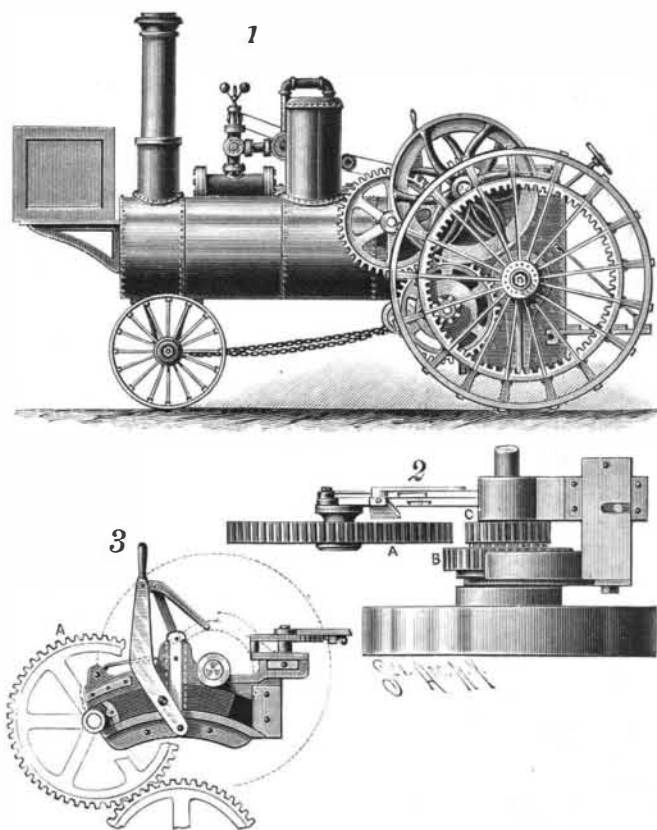


KRAFT'S WRENCH.

The movable jaw is held in place by a pin held transversely in its sides and engaging a slot in the tongue of the head. In the front face of the tongue of the head and in the under side of the jaw are recesses containing a spring to hold the jaw in an innermost position, as shown in Fig. 2. The movable head is locked in place on the handle by a toothed dog having a tongue engaging a slot in the lower end of the head, while on the opposite edge of the handle, is an eccentric cam mounted on a pin supported in lugs projecting from the head, and when the handle on the eccentric is swung away from the wrench handle, the head carrying the movable jaw can be readily moved along the handle. This wrench, while being a superior tool for pipe work, is also designed to have great efficiency for general use. The jaws being parallel allows it to grip any square nut or bolt head, and when once adjusted to the size required it cannot be changed by being moved on the bench. It is a strong wrench, and its quick and easy release from a pipe makes it very convenient in use. Further information relative to the improvement may be obtained of the Kraft Ideal Pipe Wrench Co., Battle Creek, Mich.

AN IMPROVED TRACTION ENGINE.

The machine shown in the illustration, patented by Mr. James A. Stout, can be propelled at a high or low rate of speed, and readily changed by the engineer from one speed to the other without removing or rearranging any of the parts. Fig. 1 shows the engine in



STOUT'S TRACTION ENGINE.

perspective, Figs. 2 and 3 being partial plan and side views. On the main driving shaft is a small driving pinion, C, bolted to the hub of the belt pulley, and on the inner surface of the rim of the belt pulley acts a friction pulley having a hub turning loosely on the hub of the belt pulley. On the outside of the hub of the friction pulley, and secured by a key in a longi-

tudinal keyway, is a second driving pinion, B, adapted to slide longitudinally on the hub, such movement being effected by a shifting segment by means of a handle in ready reach of the operator. The gear wheel, A, forming part of the gearing for the traction mechanism, is in alignment with the first small driving pinion, C, but is adapted to be engaged by the larger driving pinion, B, when the latter is shifted transversely. For this purpose the gear wheel, A, is mounted on a stud held on a bearing sliding in a segmental guideway formed on a pillow block, a pin on the bearing being connected with an upwardly extending lever, as shown in Fig. 3, by moving which the bearing can be shifted so that the gear wheel, A, is moved in or out of mesh with the small driving pinion, C. The gear wheel, A, does not move out of mesh with the traction gearing when the lever shifts the bearing, and the friction pulley in its normal position is always in contact with the belt pulley, being pressed thereon by springs in line with the driving shaft. When the engine is used as a power for thrashing machines, the belt can be readily tightened or loosened by running the traction engine a short distance forward or backward at a slow speed.

Further information relative to this improvement, may be obtained of the Harrison Machine Works, Belleville, Ill.

The "New Mesmerism."

Within the past few months most wonderful tales have appeared from time to time in the daily press concerning certain mesmeric performances in the Paris hospitals. It was gravely stated that Dr. Luys, of La Charité Hospital, had obtained such a development of hypnotic suggestion as to bring about a transference of sensibility to inanimate objects. For example, a person in the hypnotic state would receive a suggestion that a glass of water was part of himself and was capable of sensation. Then the glass would be taken out of his sight, and when the contained water was agitated the patient would be visibly disturbed or even give evidence of acute suffering. Other inanimate objects were capable of receiving like impressions, and there was apparent danger that this "externalization of the sensations," as it was called, would come to be regarded as an accepted fact by not a few prominent scientific men with more imagination and credulity than sound common sense.

Mr. Ernest Hart, when in Paris recently, had his attention drawn to these seemingly astounding manifestations of occult force, and was so impressed with what he saw that he determined to seek out the cause. It took him but a very short time to see that the subjects of these hypnotic experiments were impudent impostors, and that Dr. Luys was the victim of gross fraud. He suggested to the doctor the employment of certain simple tests, such as the substitution of inert substances for the drugs in sealed tubes which were supposed to act upon the subjects when brought near the body. Dr. Luys, however, declined to act upon this suggestion, saying that he could perform the experiments only in his own way, and if they failed to convince he could only express his regret. Mr. Hart then procured the attendance of five of these subjects in his own apartments and repeated the experiments in the presence of a number of Parisian and foreign medical men. The same phenomena, he says, in a communication to the *London Times*, "were reproduced with sham magnets, with substituted figures, with misnamed medicinal substances, and with distilled water, and with sham 'suggestion,' opposite suggestion, or none at all. Every one was able to convince himself that all the results so shown were, without exception, simulated, fictitious, and fraudulent. That some of the patients were hypnotic and hysterical in a high degree does not alter the fact that from beginning to end they all showed themselves to be tricksters of the most barefaced kind; some of them very clever actors, possessing dramatic powers which might have been turned to better purposes, most of them utterly venal and some of them confessing that they played upon the credulity of Dr. Luys for their own purposes."

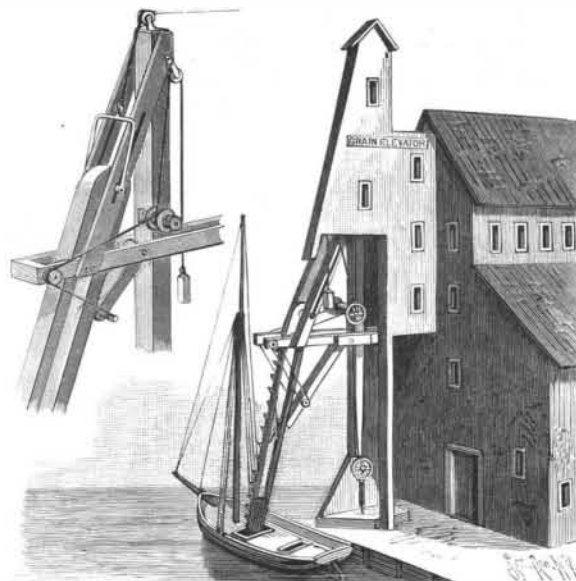
It is strange to think that men of scientific me-

dical training can be so thoroughly duped in this closing decade of the nineteenth century, and we may well pause to ask ourselves whether, after all, the world is any less credulous than it was in the good old days of witchcraft and diabolism. There may be a greater number of hard-headed skeptics abroad, but a large portion of mankind is still hungry for the incompre-

hensible and the supernatural, and as religious faith wanes superstition seems but to take a firmer hold on certain minds.—*Medical Record*.

A SHIFTING DEVICE FOR ELEVATORS.

The illustration represents a device more especially designed for grain elevators used to load or unload vessels, being adapted to conveniently shift the elevator leg to hold it in contact with the grain. The improvement is in practical service in a Buffalo, N. Y., elevator, where it is said to be giving good satisfaction. It has been patented by Mr. James Flemming, of No. 290 Perry Street, Buffalo, N. Y. The elevator leg slides in a frame extending horizontally from a post, and on the upper end of the leg are trunnions which extend through slots in braces connecting the front end of the frame with the upper end of the post. The outer ends of the trunnions are engaged by a bail connected with a rope extending over a pulley, the rope being connected with a suitable device for pulling the leg up or



FLEMMING'S ELEVATOR SHIFTING DEVICE.

letting it down. The back of the leg is supported by a friction roller journaled in the free end of a pusher arm pivoted on the frame, this arm being also connected with a rope extending forwardly and upwardly over a pulley in the outer end of the frame, thence to and around a drum turning on a stud on the vertical post, the rope then passing upward over a sheave, and supporting at its lower end a weight designed to counterbalance the weight of the elevator leg. At one end of the drum is a pulley over which passes an endless chain or rope, which passes also over a pulley provided with a hand wheel near the ground, and by manipulating this chain or rope the drum is turned to wind up or unwind the rope connected with the forward end of the pusher arm, giving the latter a forward or backward swinging motion, whereby the lower end of the leg can always be held in contact with the grain.

THE LOVELL DIAMOND CYCLE.

The new Lovell Diamond cycles, one of which is shown in the accompanying cut, are constructed much the same as the 1892 model, but with a few improvements, among which is a new Diamond frame of the Humber pattern. Lightness and strength are attained by the use of the best English seamless steel tubing, combined with American steel drop forgings. The patent adjustable ball bearings are supplied to all

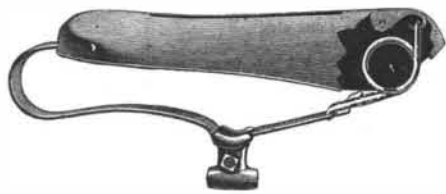


THE LOVELL DIAMOND CYCLE.

running parts, and are fitted to both wheels, crank shaft pedals and head. These bearings are constructed alike. The balls are adjusted by an adjustable cone on one side and a stationary cone on the other, the bearings adjusted by the former. Removable hardened steel ball cups and ball-retaining washers are used. A leading feature in these bearings is that, in the

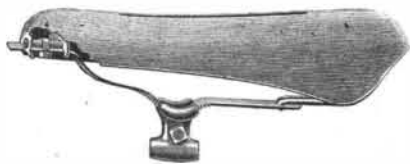
event of an accident, the cup can be replaced at a very small cost.

In the two small cuts we show a peculiar feature of construction of the saddle. By turning a screw at the end, any slack in the leather covering can be taken up at once. The other view shows how by turning a screw the position of the saddle can be in-



stantly changed on the bar, as well as the tilt of the saddle arranged to suit the rider.

The Lovell Diamond cycles have been in the market for several years. All the parts are thoroughly tested before entering into the machine and extreme care is taken in the fitting. The John P. Lovell Arms Co., of Boston, make a large variety of Diamond cycles suited



for ladies and children as well as gentlemen, and will be pleased to mail their new catalogue on application.

A Peculiar Fire.

In the *Ladies' Home Journal* for January is an account of a fire from gasoline that originated in a rather peculiar manner. A lady was cleaning a Brussels carpet with gasoline. She had cleaned about one-third of the carpet when she noticed one spot that looked a little dull and which must have a little more rubbing. She says, "I gave one quick, hard rub, the cloth in my hand ignited. There was a sort of a puff, and the flames went creeping all over the carpet I had cleaned." The explanation suggested was that the friction ignited the gasoline, but no suggestion is made as to whether that was caused by raising the temperature to a high degree, as might ordinarily happen by friction or whether it was otherwise.

Professor G. D. Shepardson, of the University of Minnesota, writing to *Science* in respect to the above, says: Some of my experience in the cold, dry climate of Minnesota has suggested a very plausible explanation for this accident, which seems surprising that such accidents are not more frequent. Our sleeping room has an ingrain carpet, from which we get marked electrical experiences. On a cold morning one can hardly take a step without being strongly electrified. By shuffling across the carpet, taking only two steps, I have many times drawn a spark one-eighth of an inch long. By taking a dozen shuffling steps and touching the water faucet I have several times drawn a spark nearly one-half of an inch long. Indeed it is so common and so excessive that it is quite uncomfortable. I have several times thought seriously of getting up some arrangement for gradually dissipating the charge on one's body, so that we can avoid the unpleasant shock when using the water. It should be stated that this high degree of electrification is not an everyday experience, but it is very common when the thermometer in the room goes below 50 or 40 degrees Fah.

A similar experience is very common here when one is putting on a fur overcoat or one simply with a fur collar. The simple rubbing of the fur in putting on the coat will so electrify it that one gets a prickly sensation from the charge from the collar when it is turned up against one's neck. Quite frequently simply picking up a flannel undergarment will so electrify it that one hears a decided crackling. These experiences are very common here in Minnesota with the dry atmosphere, and are quite surprising to one accustomed to the more moist climate of New York or the seacoast.

This experience suggests at once that the gasoline in the case above noted was ignited by an electric spark caused by rubbing the carpet.

An Unusual Foundry Experience.

A singular accident occurred recently in the foundry of the A. L. Swett Iron Works, Medina, N. Y., which seemed very mysterious.

Mr. Albert L. Swett, the proprietor of the works named, has a communication in the *American Machinist* relative to the matter.

We were melting a fifteen ton heat in a newly lined cupola, says Mr. Swett, and soon after the blast went on a number of our men were affected by gas. Out of about fifty employed in the room, seventeen were so overcome that it required prompt medical aid to restore them. They seemed to become paralyzed to a certain extent, and unable to help themselves. Some of them seemed to suffer intense agony, while others seemed

more in a paralyzed condition. And from the statement of the doctors who handled the cases, it seemed to paralyze the lungs to such an extent that it was necessary to work rapidly in order to restore the action of the blood through the system. In about two hours or more, with the assistance of four physicians and what other help we could get, all were restored sufficiently to be taken to their homes, and the most severe cases were kept away from their work only four to five days.

As to what caused the gas to affect so many at this time is unaccountable. From actual experience of over twenty-five years in the business, I have never seen nor heard of anything like it before, and in conversation with old moulders they claim they never had. The moulding shop had been idle for two days. All ventilators were closed, and the gas, after putting on the blast, seemed to settle to the earth instead of going to the chimney. It was not our custom to open the ventilators until the room was warmed somewhat from the melted iron; doubtless the gas was all retained in the room.

What Constitutes Good Vulcanized India Rubber?

An investigation has recently been conducted by Lieut. L. Vladimiroff, at the St. Petersburg Technical Institute, with a view to establishing rules or tests whereby the quality of vulcanized India rubber may be efficiently judged. It is a notorious fact that no method of chemical analysis gives reliable results for this substance. Hence the tests applied were chiefly of a physical nature. From a lengthy series of experiments the following conclusions were deduced, namely:

1. India rubber should not give the least sign of superficial cracking when bent to an angle of 180° after five hours of exposure in a closed air bath to a temperature of 125° Centigrade. The test pieces should be 6 centimeters thick.

2. Rubber that does not contain more than half its weight of metallic oxides should stretch to five times its length without breaking.

3. Caoutchouc, free from all foreign matter except the sulphur used in vulcanizing it, should stretch at least seven times its length before rupture.

4. The extension measured immediately after rupture has taken place should not exceed 12 per cent of the original length of the test piece of rubber. The test piece should be from 3 to 12 millimeters long, 3 centimeters wide, and not more than 6 millimeters thick.

5. Softness may be determined by measuring the percentage of ash formed on incineration; it may form the basis for deciding between different grades of rubber for certain purposes.

6. The vulcanized rubber should not harden under the influence of cold temperature.

These conclusions are to serve in the establishment of rules governing the introduction of vulcanized rubber in the Russian navy.—*The Electrician*.

A LABOR-SAVING SCREW DRIVER.

The "Howard-Allard" spiral, clutch, triple bit screw driver has recently been offered to the trade in new designs, though retaining all the original valuable features of the old Allard. This tool is especially adapted for light and rapid work, and is invaluable for mechanics having large quantities of small screws to drive. There is no turning of the hand and twisting of the wrist to drive a screw, which is effected by simply pushing the handle. The tool may be used as a spiral, ratchet, or ordinary screw driver. If it is found that a screw cannot be driven to its place by use of the spiral, it is readily done by using it as a ratchet or ordinary screw driver. It is provided with three bits nicely finished, of different sizes, to enable the operator to select one to fit any size screw he may wish to use. These bits can be instantly interchanged and secured in the chuck or clutch provided for the purpose. The knurled nut of the clutch is made of steel, and the socket of steel, as is also the spindle, which is provided with four spiral grooves, which are cut deep and have square sides, and which nicely fit corresponding grooves in the extra long nut through which it passes into the handle. This gives it nearly four times the bearing surface to wear usually found in this class of tools, which have fewer spiral grooves and shorter nuts. The handle is made of thoroughly seasoned hard wood, nicely finished. The whole tool is not only attractive, but also very strong and durable.

This implement is manufactured solely for the Alford & Berkele Co., 77 Chambers Street, New York City.

King Steam.

According to *Wick's Illustrierte Gewerbeblatt*, the steam power at the disposal of the civilized nations was, in 1888, as follows:

	Horse powers.	Horse powers per 100 inhabitants.
Great Britain.....	8,200,000	25
France.....	4,520,000	11
German Empire.....	6,200,000	13
Russia.....	2,240,000	3
Austria.....	2,150,000	5
Italy.....	830,000	3
Spain.....	740,000	4
Portugal.....	80,000	2
Sweden.....	300,000	7
Norway.....	180,000	9
Denmark.....	150,000	8
Holland.....	340,000	8
Belgium.....	810,000	14
Switzerland.....	290,000	10
Other European countries.....	600,000	6
United States of N. A.....	14,400,000	24
Colonies.....	7,120,000	—

According to the above table there were, in 1888, a total of 50,015,000 horse powers at the disposal of the civilized nations. The steam horse power is considered equal to three animal horse powers, and the latter to seven man powers. Hence every round million of horse powers represents not less than a thousand millions of man powers. Now, if we suppose a horse power to work, on an average, as long as a man, 1,000 millions of "man powers" are equal to 1,000 million men.

However, the civilized nations have only during the last few decennials come into the possession of these thousand millions auxiliary workmen. Although the steam engine was invented in the last century, there were, in 1840, only 1,650,000 steam horse powers in the same territory which now has over 50 millions at its disposal. Even in 1860 there were not more than 9,380,000 steam horse powers.

Now, as regards the distribution of the steam horse powers over the different countries, Great Britain leads with 25 horse powers per every 100 inhabitants, but is closely followed by the United States, with 24 horse powers per every 100 inhabitants. Next of importance, as industrial countries, are Belgium and Germany, then France and Switzerland, which are followed by the Scandinavian countries and Holland. By way of Austria are reached the countries of inferior industrial importance, of which Spain is the most prominent, while Italy ranks with Russia. However, it would be wrong to think of the greater portion of the above mentioned horse powers as being used for actually "industrial" purposes. Of the 50 millions steam horse power, only 10 millions belong to "stationary" steam engines, the remainder being divided between railroads (32 millions) and steamboats (8 millions). Hence, of the 1,000 millions auxiliary workmen who, in the form of steam engines, to-day perform service for us, not less than 800 millions are especially employed in the carrying of passengers and goods, and only 200 millions remain for industrial and agricultural purposes. It is estimated that, in 1888, the railroads of the world transported 1,430 millions tons, while 146,400,000 tons were carried by vessels, including both steam and sailing vessels. Among the articles transported by sea, coal, with 26.2 per cent, occupies the first place. Next follows wood, with 17.3 per cent; then grain, with 9.3 per cent. All other articles are of comparatively smaller importance, iron forming only 3.2 per cent of the entire transport; fabrics for clothing, 2.1 per cent; sugar, 1.8 per cent; and cotton, 1 per cent.

Radiation Through Vacua.

The experiments of Professor Dewar upon the effect of high vacua on the radiation of heat, undertaken in the course of his researches with liquid oxygen, lead to some interesting considerations that may cause us to modify entirely our conception of radiation of the sun's heat. It has been usually taken that the long heat waves, as well the short light waves, came direct by radiation from the sun, and that consequently an enormous amount of energy was continually being dissipated. But Professor Dewar's experiment tends to show that an absolute vacuum is entirely impervious to low waves of heat radiation. Interstellar space, therefore, though transparent to light radiation, does not presumably convey heat radiation at all, and the heat waves manifest in the atmosphere are created there. We see in this the necessity for remodeling our theories upon the time required to cool the earth down; for, if space is impervious to heat radiation—as is Professor Dewar's vacuum—we need not fear cooling on this account. The interstellar space has lost one of its properties, and at a stroke, by a simple experiment, a huge proportion of the supposed available energy of the solar system disappears.

TUNNELING THE SIMPLON.—Work on the new Simplon tunnel has been commenced. When completed it will be the longest tunnel in the world. It will extend from Brieg, in Switzerland, to Isella, in Italy, and its total length will be 12½ miles. It is expected that from eight to nine years will be occupied in the construction of the tunnel.