HYDRAULIC MACHINERY.

[Condensed from Engineering].

A recent inspection of the varied productions of a Birmingham firm has led us to select a few applications of hydraulic machinery for illustration, possessing as they do the merits of novelty and utility. Fig. 1 in our engraving illustrates an hydraulic pulling jack. This jack consists of a cylinder, A, which is made of various lengths to suit the required lift. A piston, B, is attached to the tube, C, which slides in the cylinder, A, through a stuffing box at the end. Screwed on to the cylinder is a cistern, D, containing the pump, E, which is actuated by the hand lever. G is a small tube attached to the pump sliding through a stuffing box in the piston, B, and extending the whole length of the tube, C. The stop valve, H, closes the communication between the pump and cylinder. I I are two small passages from the tube, C, to the cylinder, A, while two other passages, K K, connect the cistern with the cylinder at the back of the piston, B. Water is poured in through the air screw in the cistern, and, after it is full, the jack is suspended with the cistern end downwards and the stop valve screwed up. On working the hand lever the water will be pumped from the cistern through the inner tube, G, and will pass through the passages, I I, into the cylinder and force the piston, B, to the bottom of the cylinder. The water at the back of the piston returns at the same time to the cistern through the passages, K K. By unscrewing the stop valve the water will return through the passages, I I, and the tube, G, to the cistern, and the weight will thereby be lowered. This jack was originally designed for the purpose of pulling up large tree stumps when clearing forests, or estates, of timber. It will be found useful in the shop, on board steamships, or, in fact, wherever heavy weights have to be dealt with. It will either pull horizontally or vertically, and the pump being arranged inside there is no possibility of derangement either from accident or rough usage.

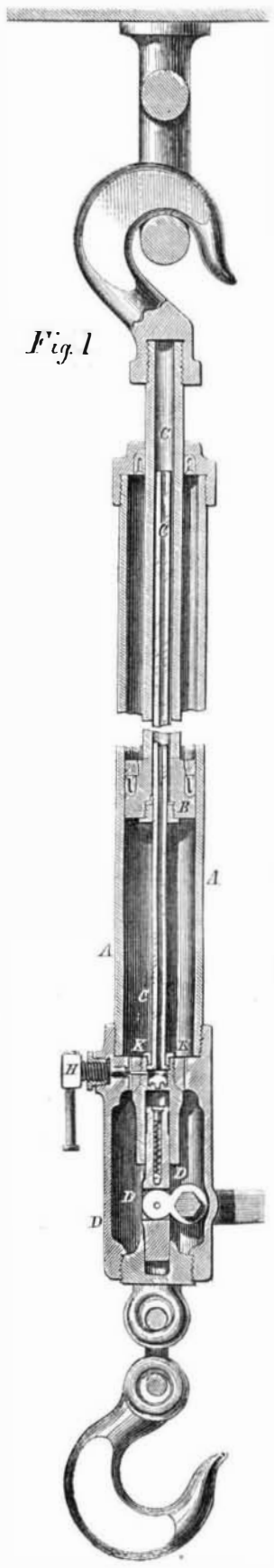

Fig. 1

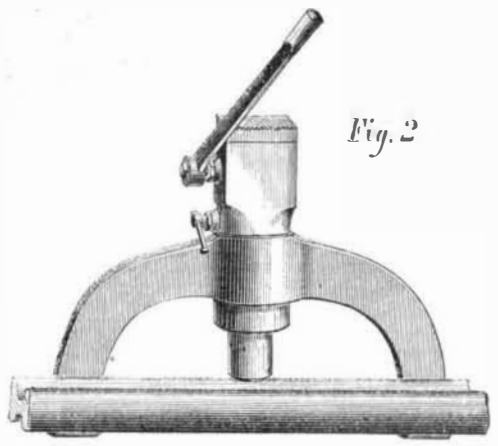
Fig. 2

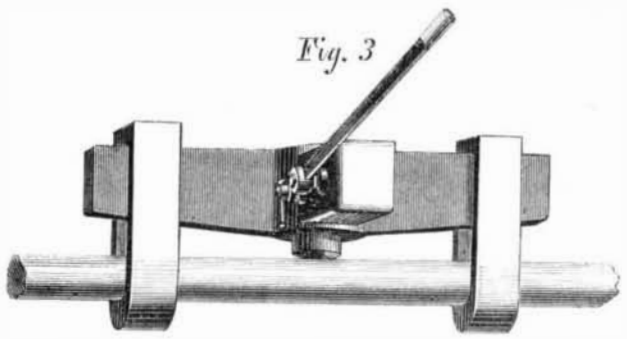
Fig. 3

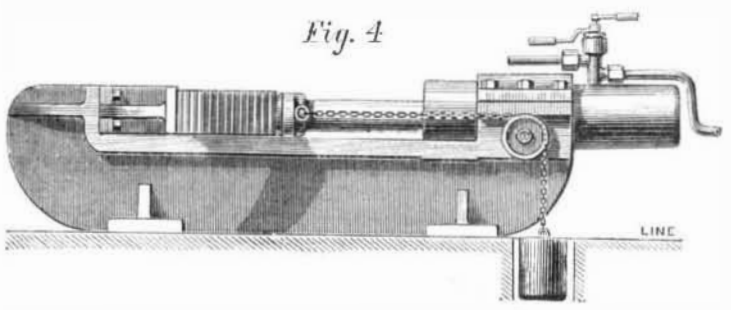

Fig. 4

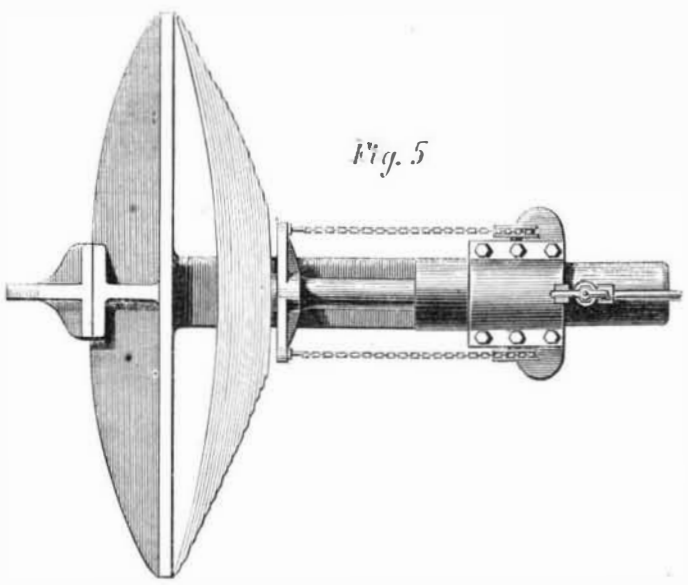
Fig. 5

Figs. 2 and 3 represent two more useful little hydraulic machines, the former being a rail bender or "Jim Crow," and the latter a shaft straightener. The hydraulic "Jim Crow" is a useful tool for platelayers; it is more easily applied, and has a great advantage over the screw crow. which takes a long time to screw up. On main lines where the traffic is great, and the thread of the screw becomes worn, it is often troublesome to get off, and involves the risk of a train passing over it. On the other hand, the hydraulic crow can be unshipped instantly. These crows are in constant use on the Great Northern Railway, and Mr. Budge, the assistant locomotive superintendent, reports favorably of them. They are there found very effective in breaking steel rails of the heaviest section. By merely nicking the rails with a chisel, they are broken off quite true, and a great amount of time and labor is saved. We should add that the jack swivels round in the frame, so that it can be worked in any position. The shaft straightener is for straightening shafting in the lathe, and is also in successful use. It is placed on the saddle of the lathe, and the shaft is passed through the straps, as shown in our engraving. The shaft is then centered, and the ram brought to bear on any part that requires to be straightened. Any irregularity can thus be far more quickly detected and adjusted than when the work is done on an anvil. The machine is lifted on and off the lathe by means of a bar which passes through an eye on each side of the straps.

At Figs. 4 and 5 we show respectively a side view and a plan of an hydraulic spring tester, which is adapted for testing the springs of locomotives, railway carriages, and wagons, etc., up to a length of 6 feet. It comprises within a very small compass a tester with hydraulic cylinder, ram, and balance weights. It has diagonal power pumps in the cistern, and is fitted with pressure gage, cast-iron air accumulator, stop and release valves, and a hand pump for charging the accumulator with air. In operating with this machine the accumulator is first charged with air at a pressure of about 300 lbs. per square inch. The power pumps are then started, and water is pumped into the accumulator until the requisite pressure is attained, which is indicated by the rising of a safety valve. Upon the stop valve being opened the accumulated pressure acts at once on the ram and compresses the spring.

To kill flies, soak quassia in sugared water. Paper saturated with this will attract and poison flies.

A Moon Fallacy Exposed.

A writer in the *American Builder* has taken the trouble to refute at length a large number of popular fallacies regarding the influence of the moon upon terrestrial things. We extract the following upon the cutting of timber and the sowing of seeds:

"An opinion is entertained that timber should be felled only during the decline of the moon; for if it be cut down during its increase it will not be of good or durable quality. This impression prevails in various countries. But can there be imagined, in the whole range of natural science, a physical relation more extraordinary and unaccountable than this supposed correspondence between the movement of the sap and the phases of the moon? Certainly, theory affords not the slightest countenance to such a supposition. But let us inquire as to the fact whether it be really the case that the quality of the timber depends upon the state of the moon at the time it is felled. M. Dechamel, a celebrated French agriculturist, felled a great many trees of the same age, growing in the same soil, and exposed to the same aspect, and never found any difference in the quality of the timber when he compared those which were felled in the decline of the moon with those which were felled during its increase; in general, they have afforded timber of the same quality.

"It is a maxim among gardeners that cabbages and lettuce which are desired to shoot forth early, flowers which are to be double, trees which are desired to produce early ripe fruit, should be severally sown, planted, and pruned during the increase of the moon; and that, also, trees which are expected to grow with vigor should be sown, planted, grafted, and pruned, during the increase of the moon. These opinions are altogether erroneous. The increase or decrease of the moon has no appreciable influence on vegetation, and the experiments of several eminent agriculturists have clearly proved this. Pliny states that if we would collect grain for the purpose of immediate sale we should do so at the full of the moon, because during the moon's increase the grain augments remarkably in magnitude; but if we would collect the grain to preserve, we should choose the new moon. So far as it is consistent with observations that more rain falls during the increase of the moon than during its decline, there may be some reason for this maxim; but Pliny can scarcely have credit for grounds so rational; besides which, the difference in the quantity of rain which falls during the two periods is so insignificant as to be totally incapable of producing the effects adverted to."

Rust Joints.

There are various recipes for the treatment of cast-iron borings, of which a so-called "Rust Joint" is to be made. In all such operations simplicity is to be commended for many reasons. First prepare the joint by bringing the inner joint rings of the flanges together—screwing up the bolts firmly—in this condition there should be an annular space between the flanges of from one quarter of an in. to three eighths of an inch in width, a strand of rope yarn or any soft fiber should now be stuffed to the bottom of the joint, so as to prevent the jointing material from being driven through in the process of calking. A good hammer, a calking iron rather thinner than the joint, and a flat piece of wood or sheet-iron should be in readiness. Now take a suitable quantity of fine cast-iron borings, free from dust, and which may be passed through a sieve to remove large pieces; next dissolve a very small piece of sal ammoniac (chloride of ammonium) in water; say a drachm to a quart (in the absence of sal ammoniac to mix up the borings with, the urine of any animial does quite as well). Now mix upon a flat board, or in a pot or pan. the borings, with sufficient of the fluid to cause them to adhere together in lumps when compressed in the hand. It is now ready for use. By means of the calking iron, and the piece of board or plate, stuff the moist material into the joint to a depth of 1 inch or so from the bottom, all round; now calk it down with the iron and hammer until it sounds perfectly solid, as though it struck against solid iron (this is the most important of all). Now again repeat the process of filling, then the calking, and so on, until the joint is filled to the very surface. It requires a considerable time, and the most careful hammering, to make a perfect joint, as, if there is the slightest trace of softness, steam is sure to escape, and gradually increase the leak. The joint should rest for at least twelve hours before being put under pressure. It will be observed that immediately after mixing the borings with the saline fluid it becomes quite hot, showing that powerful chemical action has been set up, the fact being that the immense surface of the innumerable particles of iron already in contact with the atmosphere, at once, through the presence of the moisture and the destruction of the balance by the presence of an unstable salt, begins to absorb the oxygen of the air. Now it must be observed that as the oxide of iron is being formed, it is held in solution by the still undecomposed chloride of ammonium, which accounts for the mixture remaining black for a time. This is useful in so far that it gives time for the operator to complete his joint before the solid oxide is really deposited. At this particular stage, were steam or water turned upon the joint under pressure, it is clear that the solution of iron oxide would all be washed out and leave the clean borings all but useless; but when time is given for the complete decomposition of the ammonia chloride, and the gradual evaporation of the component gases, the oxide is, as it were, precipitated, and forms a solid cement between the particles of iron. Rust joints very often prove a failure through a neglect of principles. It is evident that an overdose of sal ammoniac, a very common error, must be a source of failure—that the rust cannot form during the presence of the free salt.

A humane way of killing insects for preservation is to drop them into a jar of carbonic acid gas. This does not injure their colors in any way, but kills them quickly. The gas will be easily retained in a stoppered bottle, and is very easy to make. The action of sulphuric acid upon marble dust, or carbonate of soda generates it rapidly. Insects thus killed can be kept perfectly in the gas till they are put in the cabinet.