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Jackscrews

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JACKSCREW.

The jackscrew is not one of the most conspicuous machines, and consequently we do not hear as much of it as of many other common appliances more often seen and used. Nevertheless it is very useful in its place and has perhaps developed as much in its time as many more delicate implements.

Primarily, the jackscrew is a device for the application of the screw to the moving of heavy weights.

All large screws have been until within comparatively recent years, in an early stage of development, having been cut out by hand from hard wood; thus necessitating the expenditure of much time and labor to insure a good fit. Then, when looked at from the present standpoint, they were of inferior quality - even when made by the best workmen. Wooden screws have about one-thirty-fifth of the strength of cast iron ones of the same form and size. If to this difference, the friction caused by the lack of fit in the threads is added, it will clearly appear that a change from the wooden to the iron would be one welcomed by all

having occasion to use any type of large screw.

At present perhaps, the old cider press screw is the most common form of the wooden sort in existence.

A screw might be defined as a cylinder, having a spiral ridge winding about its circumference, either on the inside or outside. These ridges, or threads, are named from their position external or internal. A cylinder having an external thread is called a screw or bolt, while one with an internal thread is a nut. The two forms are used together, except in the case of the lag or wood screw; Here the wood acts as a nut, and looked at in one way this is no exception.

A term used often in speaking of threads and thread cutting, is the pitch. This is simply the distance the nut travels in making one revolution around the screw. It is generally spoken of as so many threads to the inch; for example, if a thread had a pitch of one-sixth it would be called a screw with six threads to the inch.

In designing threads there are several forms, which

might be considered, and the choice would depend upon the nature of the work required. Each of these threads has its peculiar fitness for certain kinds of work. First among them would come the Whitworth, or English Standard, on account of its small amount of friction when carefully made. This thread was designed by Mr. Whitworth as a standard for English manufacturers. In laying his plans he had in view two objects; to make a thread, which would do away with a part of the rapid wear attending all the other threads, and also to make one which could not be easily copied by other machinists. To attain the first end sought, he gave the tops of the threads a curved surface. To accomplish the second object, he made the slope fifty-five degrees instead of sixty, the angle in general use as fifty-five degrees would be much more difficult to find. Besides the tools necessary to cut such a thread would be costly. Thus it satisfied the proposed conditions, but much better at first than at present, for now the angle of fifty-five degrees can be almost as easily found as that of sixty.

A thread much used in this country especially for steam and water pipes is the sharp V thread. Its sides slope at an angle of sixty degrees with the bolt, but the top of the thread is carried up to an edge. This sharp edge is objectionable in thread cutting tools for ordinary work, as it is quickly worn off; and then the screws and nuts made with them will not fit or are so tight that the stresses in the screw weaken the ultimate strength of the whole.

This sharp V thread has been modified, and now has several forms. One of them is the United States Standard thread. It might be described as a V thread divided into eight parts, the upper eight being removed and used to fill up the groove between the threads. Two other types are the ratchet and double thread. The ratchet is made by cutting under one side of the V, which although rendered weaker has increased power of conforming to the threads of the nut.

A double thread would be cut the same way as a single one.

This is a device for obtaining a rapid advance with but few turns, at the same time keeping as much metal as possible in the screw.

The definition of work is given as the overcoming of resistance through space. The jackscrew is a means for gaining this result, and the work obtained will be just equal to the energy expended minus the friction. It will be the same as in a simple lever. There is a lever attached to the screw which is placed in some standard and remains stationary. Then by taking moments the power moment must equal the work moment. The power moment here will be the power applied times the circumference of the circle described by the lever as a radius. The work moment will be the weight raised times the pitch of the thread.

In the experiments made at the shop to determine the work of friction for threads, some jackscrews were made. The standards were of cast iron, and the screws were of wrought iron one and one-half inches in diameter. In order that the threads might of as nearly equal strength

as possible, they were made in the cast iron three-sixteenths of an inch in thickness and in the wrought iron one-eighth. The threads were given a pitch in each case three and one-fifth to the inch.

To determine the working qualities of these threads, several trials were made with the testing machine. First a lever of known length was placed in the head of the screw, then the whole was put in the machine and the scales adjusted. The energy required to lift any load was found by noting the scales at that load and noting the amount of pull necessary at the lever to raise it. By using the law of the lever, the work due to friction could be easily determined. In the screws tested the work lost in friction was about fifty per cent of that expended.

Jackscrews are now made in which the lifting power is furnished by a small hydraulic pump within the body of the screw. The work of friction is then comparatively small. Ball bearings are also used with the same result.

The mechanical world could not dispense with this tool. With it houses are raised, enormous weights

are moved, and the largest ships are launched. It would seem if the feat were ever accomplished that the humble jackscrew may be the lever which will move the world.

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