



### Queries on Belts Answered.

MESSRS. EDITORS:—I have read with much interest the various articles relative to belts. I have known of power being let by the inch of belt running 800 feet per minute, which is a poor way of letting power for the landlord. I have charge of an engine that runs 40-horse power. It has worked as high as 65-horse power, by the rule of 33,000 pounds one foot high per minute with the same width belt, viz., 16 inches. It runs 1,600 feet per minute, which would make 32-horse power according to theory, but practice shows double this power.

I submit the following answers to questions concerning belts in your last issue:—

In my experience I have found that a double belt would do the work with ease that a single one of the same width could not do. Mr. Arnold's plan of running two single belts, one over the other, is new to me, but there is reason in it.

Belts that are soft on one side get crooked, so that in running they go nearly off the pulley, when the resistance of the machine that is driven causes the belt to slip off.

I never knew of a belt that did not run on a tight and loose pulley to twist. Some machinists make the tight pulley a little larger than the loose, so as to twist the belt, especially if there is a space between the two, and the shipper is very near the pulley.

Opinion is pretty equally divided on which side out the belt should be run. A belt will drive more on the hair side. I think it will wear longer on the flesh side, as the quality grows better as it wears from the flesh to the outside.

Nothing in my experience is so good for belts as neat's foot oil, and but little of that.

A straight-faced pulley is much better than a crowned one. A crowned pulley keeps an unequal tension on the middle and edges of the belt. Crowned pulleys are only useful, in my opinion, to unskillful millwrights.

Lacings crossed on the inside are more liable to cut on each other by the pressure on the pulley.

New York, July 20, 1865. A. M. W.

### Tempering Mill Picks.

MESSRS. EDITORS:—In your journal of July 8th a correspondent wishes you to publish what you know about tempering mill picks. As he does not wish to pay for any one's experience, I will give mine gratis. A mill pick should be of the first quality of cast-steel, and should not be overheated; heat of a charcoal fire is better than stone coal. If you use stone coal burn out the sulphur before heating the pick. Heat the point and mass of the pick a straw color; sharpen and refine by dipping your hammer into water, and hammer until nearly cold; heat repeatedly if necessary; sharpen both ends before tempering. To temper, heat very slowly and uniformly; heat to a light cherry red or dark straw; temper in a solution, say, to two gallons of clean water add half pound of alum, one ounce of saltpeter dissolved; then add as much clean salt as will dissolve; dip the point in the mixture as far up as you wish to temper; move it around until sufficiently cool, then rub the point briskly in the scales on the anvil block, then plunge the pick in cool water before the temper runs down. If properly done you will have as good a pick as you wish for.

A MILLER OF THIRTY YEARS' EXPERIENCE.  
Wiscay, Alleghany Co., N. Y.

### The Main Spring Question.

MESSRS. EDITORS:—On page 36, present volume, in the article on "Main Springs," etc., it appears to me that your correspondent is increasing, rather than diminishing, the liability of the main springs to break. If the spring is thicker in the center, or raised, as he says, having to bend around the arbor and itself, it would have the tendency to fray itself to pieces by the center being the larger and the sides the smaller arc of a circle. The same may be said of the flat spring; that the outside of a spring is a larger arc of a circle than the inner, by the difference

of the thickness of the spring, but in the proposed spring it is increased by the difference in addition to the thickness by the height that the center is raised. The proper spring would be stronger, but would, I think, possess this additional cause of self-destruction. My observation is that the changes of the wind have more to do with breaking main springs than any thing else; let the wind suddenly change from north or northwest to east or southeast and I expect and usually find a harvest of watches with broken main springs, those that have been in ten, fifteen, or twenty years, equally as well as those that have been in only as many days. And it does not make any difference, either, that the watch was in the pocket or hung up at the time of the change of wind. Another cause of broken main springs is, the sultry weather of dog days, in August, when nearly one-half of our work is to repair watches with the spring broken.

I do not know what connection there is between a change of wind and a main spring, but my own observation and that of other watchmakers of large experience confirm the above remarks. The breaking of the main spring is the lesser evil, the breaking of the center pinion, which so frequently follows that of the spring, is the greater; if by some means that could be prevented it would be of more benefit.

A friend has suggested another source of the breaking of springs—thunder storms, when it is not unusual to have a number break, hanging on the board.

FRANCIS STOWELL.

### A Problem of Raising Weights.

MESSRS. EDITORS:—Can you tell me what will be the constant strain on a rope raising a weight of 3,000 pounds, ten feet per second, perpendicularly?

Also, what is the percentage of loss of power in the crank, in changing the reciprocating motion of a piston to the rotary motion of a shaft?

What authority can you name to me which treats of these subjects plainly and simply?

C. H. R.

New York, July 16, 1865.

[The strain on the rope is increased beyond that of the weight only while the velocity of the weight is increasing; after a velocity of 10 feet per second has been imparted to the weight then to maintain this requires only the strain of 3,000 pounds. The increased strain, while the velocity is being given, depends on the rapidity with which the velocity is imparted. To impart a velocity of 32 feet in the course of one second requires an additional strain just equal to that required to sustain the weight. You will find this problem fully discussed in "Bartlett's Mechanics."

The loss of power in changing reciprocating into rotary motion by the crank results only from the increased friction; the amount of the friction depends of course upon the material of which the bearings are made, the perfection of the workmanship and the quality of the lubricator. The best treatise on friction is to be found in "Morin's Mechanics."—Eds.

### Noise an Indication of Rain.

MESSRS. EDITORS:—Will you explain through your paper why sound travels better just before a storm? People living ten or fifteen miles from a railroad on distinctly hearing the cars, exclaim, "It's going to rain."

I. T. E.

Grand Rapids, Mich., July 15, 1865.

[The distance at which sounds can be heard depends much on the state of the atmosphere; but if you live north or west from a railroad, you would hear the cars more distinctly when the wind was from the south or east, and that wind would be likely to bring rain.—Eds.

### The Crank and Eccentric.

MESSRS. EDITORS:—I have repeatedly seen statements in your paper to the effect that the crank and eccentric were always at right angles to each, or near it. This is not so; in some cases the crank is with the eccentric, as in a beam engine for instance. I think this statement should be corrected in your next issue.

Mystic Bridge, Conn.

G. W. R.

[We do not remember to have stated that the eccentric was always at right angles with the crank, because we know better; if we did it was an error. We have said, however, that in most cases the eccen-

R. H., of N. Y.—We notice your letter in relation to the article on the slide valve, and the criticisms thereon. Also your inclosed tracing. You are correct in one point, which is, that in the first diagram the eccentric is on the upper side, when in order to turn the crank as the arrow points it should be on the lower. This is not a material difference, as the main object was to show the position of the eccentric with relation to the crank. In the second diagram the same position is shown, as we well know, and is there pointed out as an error purposely. The tracing of the valve and eccentric sent is a fancy sketch, which shows nothing except that the parts in question, as you have drawn them, are wrong, and would never work. If you will take the trouble to go on board a steamer you can satisfy yourself by observation of the correctness of our article.

B. C., of Del.—There are only two kinds of primers used in artillery service—friction and percussion. A percussion primer is a quill full of fine powder, capped by a percussion wafer made of mealed powder and fulminate of mercury. A friction primer is a tube full of powder, with a spur on top full of a composition that explodes by friction, and is set off by a wire pulled through it by a lanyard or rope.

J. A. J., of Ill.—In summer the sun rises north of east and sets north of west. For his yearly track through the heavens see a celestial globe.

T. M., of Conn.—A correspondent puts the following query:—"Suppose the piston in the middle of the cylinder, is there any more steam room on one side than the other? I should say not." You would be in error, then for the capacity of the upper side, supposing the engine to be vertical is less than the lower by the diameter and length of the piston rod in it.

C. H. B., of Mass.—Windows are crystallized, or made to imitate ground glass, by dissolving epsom salts in hot beer or a weak solution of gum arabic. You can make any pattern or border you please, by cutting out a design on a sheet of pasteboard, and rubbing the design with a damp cloth.

L. W., of N. Y.—One kind of toilet rouge for the complexion is made by powdering isinglass, or "mica," and coloring the same with carmine.

B. P., of Ill.—Rupert's drops are simply melted glass dropped into water. They form a bulb like a pear, with a stem. The thick end may be struck with a hammer without injury, but if you break the tail the whole affair will explode.

J. R., of N. J.—The density of steam depends upon the pressure, and if the steam is saturated—not superheated—the pressure bears a constant relation to the temperature. On page No. 48 of our last volume you will find a table of densities of saturated steam at various temperatures, from 136° to 288°. At 136.77° a pound of steam fills a space of 132.6 cubic feet; at 242.90°, a space of 15.11 feet; at 288.25°, a space of 7.202 feet.

J. D. H., of Ill.—Find illustration of apparatus for distilling spirits of turpentine from wood on page 24, Vol. XI. It was invented by Seth L. Cole, Burlington, Vt.

D. L., of Pa.—Several different machines for mining coal have been described in the English papers, but we do not know that any of them has been practically successful. They were all designed for bituminous coal.

A. P., of N. Y.—You ask us to tell you all about making rods to find mines in the earth. We do so with pleasure; they are all humbug.

Q. B. S. M., of Md.—Any good treatise on geometry will give you the information about the cycloid.

A. A., of N. Y.—It is quite common for different persons to have the same ideas. Your experience on this point will probably prove valuable to you.

D. W., of Ill.—Your specimens are common quartz, of no value whatever.

G. W. J., of Me.—A Blanchard lathe will make your toy boat complete, from stem to stern, out of a single block. Of the value of such a trade you must be the judge.

R. G. N., of Wis.—You can determine the altitude of the sun on land by means of a quadrant and an artificial horizon. For the arrangement of the latter, consult a book on navigation.

C. B., of Mass.—For Patent Report apply to your M. C. Patentees are not entitled to copies. You may get one as a favor.

A. A. H., of Me.—There is no cement in the world that will line a revolver cylinder, that is worn out, so as to make it useful again.

W. E. C., of Conn.—We have no means of judging positively what amount of fuel you will save by a heater, but the economy will be great—certainly 10 per cent. You can inject hot water to your boilers with a common pump, provided the same is so arranged that the feed water flows into it. Take a piece of square rubber, a quarter of an inch less than your stuffing box, wind this with cotton yarn—lamp wick—until the gasket so made fits the stuffing box; cut it in lengths, so that it will meet at the ends, and pack the valve stem with it. A piece of lead pipe, with a piece of hemp gasket run through it, is a good thing to put in the bottom of the piston-rod stuffing box. The pipe must be hammered square first. Put a common hemp gasket over it.

C. C. B., of Pa.—An idea is not patentable unless it takes some palpable form, as in a machine, a design or a new process. Your project for operating balloons by ropes—hauling them down when they reach a certain altitude—has been practiced many times.

W. E. S., of Ind.—To make matches consult Vol. XII., where you will find a variety of recipes for the purpose. We are called upon sometimes to publish the same recipe an unreasonable number of times.