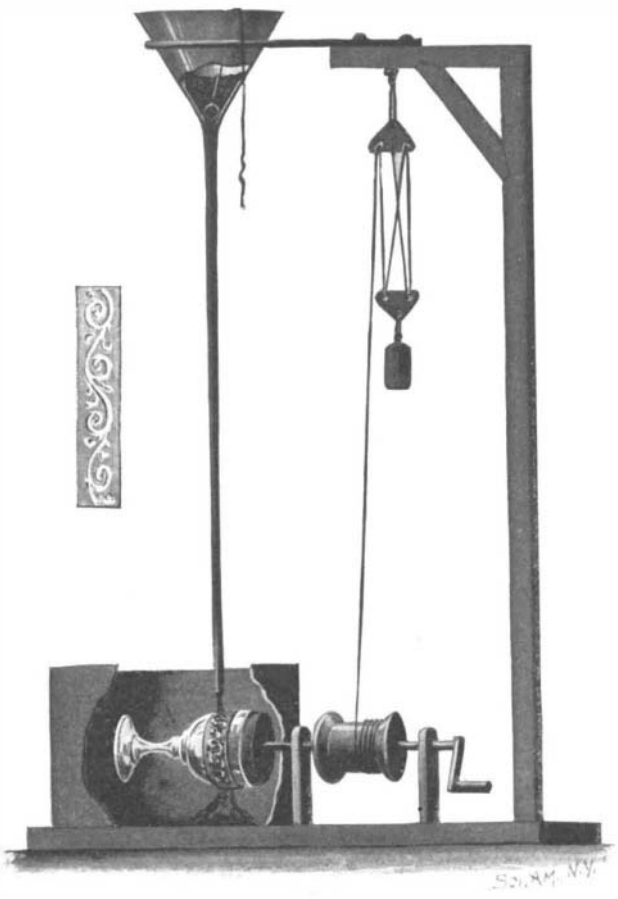
HOME-MADE DEVICE FOR DECORATING GLASS.

One of the SCIENTIFIC AMERICAN staff has devised a very simple and inexpensive apparatus for cutting initials, monograms and ornamental borders or bands on glass articles, such as tumblers, bottles, hand mirrors, etc., with emery powder.

When a letter or the like is to be cut in the glass, the glass may be held stationary by any suitable means and then all that is necessary is about three pounds of medium-grade emery and a funnel having a tube from four to five feet long and one-fourth of an inch in diameter. The initial is cut through a paper stencil, which is fastened to the glass with mucilage, or held in place by rubber bands. The emery, falling through the tube and striking on the exposed glass, will cut it quite rapidly, and three or four runnings of the emery will form the cut sufficiently deep. It may be stated that the stencil should be a trifle larger than the desired cut in the glass.

To cut an ornamental band on a goblet, tumbler or bottle, the work should be rotated slowly about two inches below the funnel tube. The turning, of course, may be done by hand; but this will be somewhat tiresome, and thus tend to lessen one's interest in the work. A boy with a little skill can rig up an old clockwork to do the turning, or the device illustrated here may be constructed from material found about the house. It consists of a suitably-mounted spindle, having a block of wood or a large cork on one end to fit snugly in the tumbler so as to support it, and also secured on the spindle is a drum, conveniently a large spool, from which a cord extends to connection with a fixed double pulley and a movable double pulley to which the actuating weight is attached. If it is not convenient to procure pulleys, plates of metal, or even of wood, may be pierced with holes, through which the cord may pass, as shown in the cut; but, obviously, pulleys are preferable because of the smaller friction and wear on the cord, which last may be a small fish line. When it is desired to inspect the progress of the work, the flow of emery may be cut off by a small cork attached to a string. When the string is loosened the weight of the emery will force the cork into the upper end of the funnel tube. The spindle should be provided with a crank for convenience in rewinding the cord, and during the rewinding the work of the emery may continue.



GRAVITY METHOD OF ENGRAVING GLASS WITH SAND.

A NEW VARIABLE SPEED TRANSMISSION.

The special device which accomplishes the changes of speed plays a very important part in mechanics in general and particularly in a gasoline automobile. All the ingenuity of the various constructors has not as yet resulted in the complete and definite solution of the problem of a transmission where the modifications of speed are progressive, silent, and without shock. The necessity for an arrangement of this kind in a gasoline carriage results from the nature of the motor itself, which will operate satisfactorily only under certain conditions and within certain limits of speed and power. For instance, if the shaft of the motor be connected by an invariable transmission device to the driving axle of the carriage, and a proper speed reduction to run the vehicle on the level is used, the increased resistance to traction on a grade would stall the motor. It would be incapable of adapting itself to the changed conditions and would simply refuse to work. Notwithstanding the many inventions which this problem has called forth, it is still generally solved in most instances by putting under the control of the operator three or four different speeds. He passes from one to the other with sudden jerks and a disagreeable racket which tell well enough to what harmful shocks the mechanism must be submitted. Certain constructors just as often connect the two shafts through trains of gears, when they wish to obtain different speeds. This arrangement is difficult to operate, noisy, and heavy, while in order to modify certain of its defects as well as to avoid breaking off the teeth of the gears, friction clutches are often added, which increase the weight, size, and price of the apparatus. Other manufacturers have recourse to belt transmission, which is assuredly more pliable and quiet. But here again it is necessary to employ numerous pulleys and belts in order to obtain the different speeds. Parallel cones set inversely with a belt capable of being slid on them laterally, and thus of producing all possible speed variations, have also been thoroughly tried, but the adherence of a belt on a conical surface is always more or less defective. Numerous and eminent inventors, including such men as Edison, have attempted to find a practical solution of this problem. "As long as it applies to the transmission of small powers only," says M. Hirsch, "the problem is relatively easy." Among other devices attention should be called to the transmission by means of rollers that can be moved to variable distances from the center of a flat disk or from the point of a rotating cone. This principle has been used in numerous different forms, one of the most remarkable of which is that of the American constructor Sellers. Mention should also be made of MM. Bataille & Bloom's expansible pulleys, on which the round or V-shaped cord or belt runs on the circle of intersection of the sides of the pulley, which is varied in diameter by moving the sides together or apart. Analogous transmissions have been devised by Richard Simms, Gordon, Reeves, and others. These systems are inadequate for the transmission of any large amount of power, and when comparatively large powers are to be transmitted it is necessary to employ a wide flat belt running on a pulley adapted to it. The problem has therefore remained unsolved up to the present. Now, however, we are happy to state that the new form of pulley devised by M. Roger de Montais has at last furnished the ingenious and complete solution which has long been awaited.

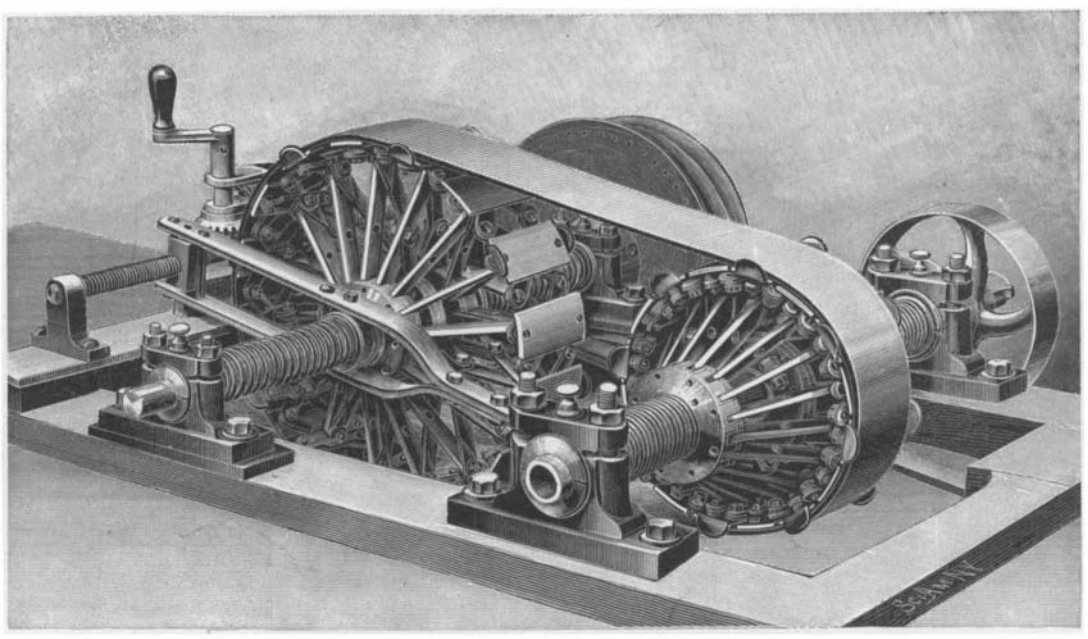


Fig. 1.—GENERAL VIEW OF THE ROGER DE MONTAIS TRANSMISSION.

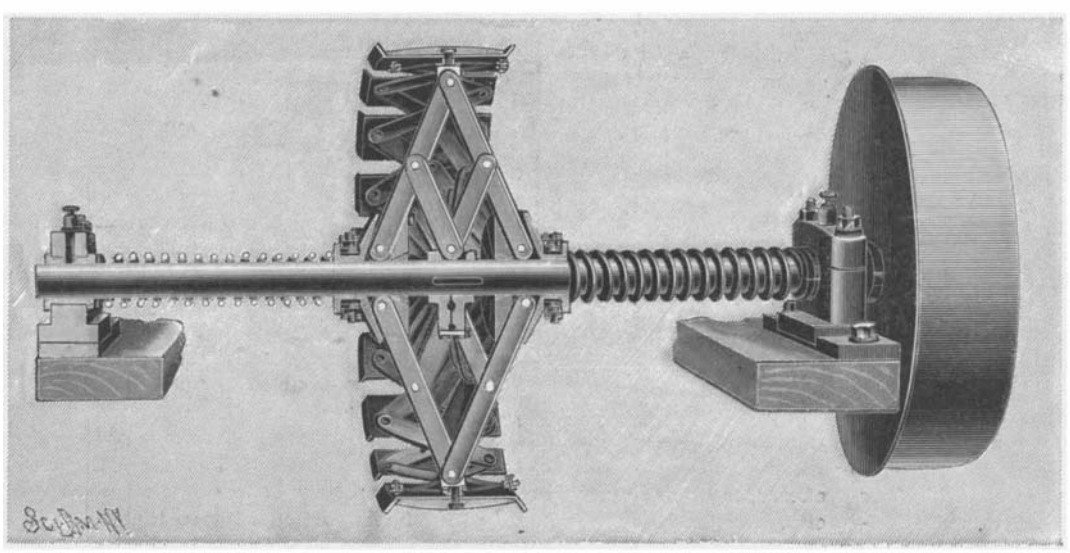


Fig. 2.--DETAILS OF THE TRANSMISSION.

The question may be asked as to what is necessary for the complete solving of this problem. The essential feature is that the two connected pulleys, which form the transmission at normal speed, be able to gradually change in diameter while the apparatus is in full operation, one contracting and the other expanding without the belt's slackening. This is precisely what occurs with M. de Montais' pulleys. The arrangement consists of two expansible pulleys with cylindrical rims which carry a wide, flat belt; and suitable levers for varying the same. The rim of each of the pulleys is made up of sections, and each section is supported by two rods forming a V and pivoted to the section at the apex of the latter. The center of each of the rods forming the V is connected by a short rod to a central holder fast on the shaft between the legs of the V, the whole forming a lozenge-shaped frame, as will be seen by a glance at Fig. 2. As these supporting frames are all equal, they expand and contract together. They are made of light rods cut from sheet steel, which, being somewhat elastic, will give a little.

The middle of the pulley is in three parts. The center part, as just stated, is fast on the shaft, while the two side holders slide along it, thus bringing together or forcing apart the ends of the V-shaped supporting arms, which results in expanding or contracting the pulley. When the latter is contracted to the fullest extent, all the sections of the rim are close together, thus forming one continuous surface. The sections are connected by a circular lazy tongs which serves to brace them. The pulley is driven by the central part or the hub, which is fast on the shaft and which transmits its movement of rotation through the pairs of small steel arms connected to it and to the V of every segment of the rim.

The transmission is composed, as has already been shown, of two expansible pulleys connected by an endless belt, the tension of which tends to contract the pulleys and force aside the movable hubs. The inventor counteracts this tendency by means of springs coiled around the shaft and pressing inward the movable hubs. The springs bear against rings mounted on the shaft, and in such a manner as not to cause any undue friction. The pressure of these springs diminishes as they lengthen, but at the same time the diameter of the pulley increases as well as the opening of the V formed by the jointed supporting arms. The result is that, if the power and flexibility have been correctly calculated, the belt is always held quite taut. Protection is had, therefore, from accidental slipping of the belt, which is often so disastrous and difficult to evade in all ordinary belt transmissions. In fact, the antagonistic effort of the springs takes up automatically any shrinkage or stretching of the belt that may occur in service without, however, producing anything more than a very slight variation in the diameter of the pulleys.