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#### CHANGEABLE SPEEDS.

It is beyond question that our present method of changes of speed of lathes, drills, milling machines, planers, and other tools where changes of speeds are required is a crude one, and unworthy of present mechanical capability. At the best, our changes are made by moving the belt from a the propeller are six in number, or rather the engine is a large driving pulley to a smaller driven pulley, or from a small driving pulley to a larger driven pulley. But each of these changes involves a positive and unalterable degree of peller per minute. It is calculated and confidently believed change of speed. It must be "Hobbs or nothing." A that the speed of this torpedo will be almost if not quite at graded pulley may range thus in diameters: 6 inches, 8 inches, 10 inches, 12 inches. Suppose the spindle speed is face or from thirty inches to forty-eight inches. A distance 200 revolutions per minute, the small delivering pulley of two miles will be traversed in six minutes, giving little 500 feet, and the last 600 feet. Between these changes of sive measures, even if they could detect its starting and de-100 feet per minute there are no intermediate speeds. It termine its approach. The motive power of the engines is must be a change of 100 feet per minute. This is a favorable estimate of the changes of graded pulleys; it is seldom the grades are so near or that they range in the proportion stated-6 inches to 12 inches. Generally the total range of change of speed is much below these two proportionate extremes.

Now there is no theoretical reason, and no mechanical imcan he.

There is in use for the potter's wheel, and also for the sewing machine, a mechanical device that will give a long range of speeds without any sudden and abrupt changes.

It is a simple device—a rotating disk twenty-four, thirtyto periphery extends a shaft feathered (with fixed key) the instances, however, where the head is hald the failure of pulley controlled by a forked guide attached to a lever continued so long, that the papilla no longer exists; it has on the turned face of the disk, which revolves at a constant speed. If the roll is near the hub of the disk, its speed may not be fast; but if it is guided too near the rim of the disk, its speed is correspondingly increased.

Suppose the disk to be 36 inches in diameter, and allow four to the extreme 800 feet, can be had and be maintained. This hold their ground for all time to come. is not possible with exact graded pulleys. And more than immaterial. I have seen it on a horizontal shaft driving an upright shaft, and on a vertical shaft driving a horizontal or of leather, or be of hard rubher—the latter not to be used in oil, but is unaffected by water. There is no question of the utility of this device as already used, and there seems to be no insuperable obstacle to its adaptation to small upright drills and other small machine tools.

# AUTOMATIC TORPEDOES.

waters, fixed torpedoes have proved, in some cases, effectual in preventing or at least delaying the approach of an long ago extended to the offensive, and there is no ma- sirable, but it is not at all likely to be accomplished. chinery in existence that has more certainly and abundantly proved the resources of the machinist than that which isemdiameter in its central and largest portion. It carries a charge of an explosive in its forward end sufficient to blow the largest and strongest ironclad that ever floated to "king-6 dom come." In the after compartment and all amidship are the generator, the engine, the steering apparatus, and the propeller shaft, and at the outer end the propeller. Adjustable rudders determine its depth under the water and direct its course. All the machinery is of the very best construction; no expense is spared for exact and perfect workmanship. From the shore, or from an anchored ship, one of these destroyers can be sent a mile, one and a half miles, or even two miles, being guided in its course by the operator at the fixed starting point, by means of wires and electricity. The torpedo can be sent at a speed that absolutely prevents preparations to defend against it, even if any ordinary defense was possible.

At the works of the Pratt & Whitney Company, Hartford, Conn., there is now being built, under the direction 7852 of Mr. George E. Haight, one of his torpedoes that is to be dom is to be content.

submitted to a foreign government for approval before the award of a contract for a number of these naval weapons. This one is being made of sheet copper instead of sheet steel, the material of which most of the Lay-Haight torpedoes has heretofore been made. The engines which are to drive group of six cylinders working synchronously with a speed that will develop about 1,000 revolutions of the screw prothe rate of twenty miles per hour at a depth below the surwould give 300 feet per minute, the next 400 feet, the next opportunity for the crew of a hostile vessel to take defencarbonic acid gas.

## BALDNESS .-- ITS PREVENTION AND CURE.

The mode of formation and growth of the hair is now so well known that there can be no question as to the cause of haldness. It is produced by a failure of normal nutrition in the papillæ at the base of each hair follicle. Imperfect pediment, or hinderance, to such an arrangement of changea- work being done in the capillaries, which are here richly ble speeds, for at least some of our machine tools, as shall distributed, the cells which constitute a bair shaft are not greatly increase their usefulness. But our machine tool formed in their due proportion, the old shaft thus feebly builders appear to run in ruts-shop ruts-and are slow to sustained becomes loose and drops away, leaving nothing in adopt a new thing and slow to adapt an old thing. Some of its place. This failure of nutrition may have a sudden cause, our light lathes and our light upright drills, which are fed of which the effect will be but temporary. For instance, an by hand so as to be properly called "sensitive," would have attack of typhoid fever often leaves the papillæ of the scalp their usefulness greatly increased if the speed could be as so much enfeebled that rapid haldness ensues. The papillæ, exactly and designedly governed and regulated as the feed however, still retain their vitality, and as the system regains its strength they quickly recover their potentiality, and the hair comes again, perhaps thicker than before.

In the same manner certain cutaneous affections may cause the bair to fall by an action on the papillæ which is hut temporary; in such cases recovery, perhaps with assistsix inches or larger in diameter, and across it from center ance, perhaps withoutit, is possible. In the great majority of entire length. On this shaft traverses a sliding roll or small nutrition of each papilla has come on so gradually, and has moved by hand or foot. The roll has a hearing by spring passed away by atrophy; its capillaries have become obliterated, and even the follicle itself no longer constitutes a depression in the cutis, and the scalp has the smooth and shining appearance which we so well recognize.

It is easy, therefore, to see that in such a condition as this no renewed growth of the hair is to be expected, for the inches for a hub. The driven wheel at the nearest point to anatomical structure which caused its development and conthe hub-say six inches-will have a speed (at the initial tinued it has ceased to exist, and the countless remedies which speed of 200 revolutions per minute) of 300 feet per minute, are so freely advertised as being able to rejuvenate bald If the driven wheel comes away from the hub, or the six heads are utterly of no avail. They serve only to illustrate inches around it, to 16 inches beyond, it will have a speed the greed and the impudence of the inventors, as well as the of 800 feet per minute. But better than these extreme credulity of the purchasers. But such is the desire to escape changes is the fact that any speed, from the initial 300 feet the appearance of "growing old" that no doubt they will

But now arises the question, Cannot the application of this, there need he no stoppage of a machine or shifting of the various agents to the scalp, at the time when the hair is helt to effect all these changes; a movement of the foot on a beginning to lose its hold, he of service in stimulating the treadle or the hand on a lever will do the business. The follicles and papillæ into renewed and permanent vigor? lever that guides the friction wheel across the face of To this question it is not possible, on theoretical grounds, to the disk can be made to be secured or latched at any say no, absolutely; but in practical fact that is the only true point to make a constant velocity, and the degree of velanswer to give in the vast majority of cases. The cause of locity between the slowest and the fastest may be controlled the falling of the bair has been already stated, and safe reaexactly. The position of the driving disk and its shaft is soning tells us that our only hope can be in that which can restore the failing vitality, and we well know that we should not expect to secure this on any other part of the skin by shaft. The friction roll may be made of disks of raw bide filthy oils and washes. Proper cleansing of the scalp is as important as it is of all other parts; nothing else should be applied to it but common sense.

There can be little question that the continued close covering of the head with hats and caps is one very constant cause of haldness. Women, in our own communities, seldom lose their bair, except from sudden causes; and among those nations where the head is habitually left bare or but During a war, where it is waged partly on navigable slightly covered, haldness is practically unknown. At the same time the heard, which is of the same class of hair as that of the scalp, but which is always uncovered, does not enemy's ships. But the torpedo branch of naval service has fail with age. A reform in our style of head gear is very de-

The suggestion was some time ago made in our columns that hald heads might perhaps he covered anew with hair hy ployed in the working of the offensive automatic torpedo. "skin grafting," i. e., applying hits taken from other scalps As an illustration take the Lay-Haight torpedo. This is a and causing them to take root and spread. No doubt such cigar-shaped vessel thirty feet long and perhaps thirty inches bits might be attached, but the whole matter is merely a wild fancy without practical value. We can make " grafts" take hold, but it is only where the skin is destroyed and the surface raw and exposed, commonly rendered so by disease. Assuming that some person (though it is difficult to believe that such a person could be found) would consent to have his scalp peeled away in preparation for the operation, and then assuming that some other person could be found who would consent to appropriate his own scalp to cutting out the proper bits for the work, yet then the very best possible success (even theoretically) must be extremely imperfect. The definded surface would heal so rapidly between the "grafts" that no extension on their part could take place, and a head with small specks of hair here and there would be the only attainable result. "Crazy patchwork" is fashionable, but perhaps not many would care to wear it in that way.

The result of all seems to be that when baldness has come slowly and naturally, it has come to stay, and our only wis-