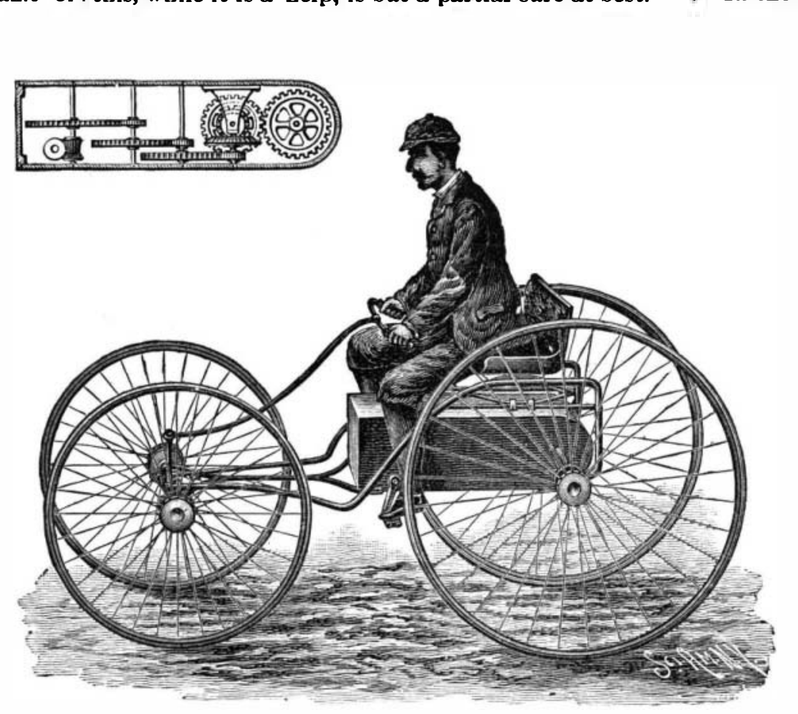
A DRIVING MECHANISM FOR VELOCIPEDES.

A mechanism designed to be readily applied to any form of velocipede, to impart a regular, positive and powerful motion from the pedal shaft to the axle of the driving wheels, is illustrated in the accompanying engraving. It has been patented by Messrs. Walter A. Evans and Thomas Cowan, of No. 267 Graham Street, Winnipeg, Canada. The driving mechanism, a vertical section of which is shown in the small view, is inclosed in a casing through the rear end of which the driving axle of the machine passes, while the pedal shaft is journaled in the forward end of the casing. A worm on the pedal shaft meshes with a worm wheel on a vertical shaft in the casing, the pedal shaft turning fifteen times to impart one revolution to the worm wheel. The motion is thence transmitted, by spur wheels and pinions, as shown in the sectional view, the speed being constantly increased, to a short shaft journaled in a bracket in the casing, and which carries a bevel gear meshing with a bevel pinion through which motion is transmitted, through a large spur gear, to a spur gear on the driving axle. The arrangement is such that the driving wheel will be turned about four and a half times, or practically so, for each revolution of the pedal shaft. A similar driving mechanism may, if desired, be employed in connection with mowers or binders, by placing the worm on the axle, when the drive wheels will act direct upon the worm wheel.



EVANS & COWAN'S VELOCIPEDE.

ONE KIND OF CAM.—*Concluded.*

BY A. D. PENTZ.

A machine to cut a cam of this character is a very simple one when made, but there are points in its construction that must be closely observed in the designing, and carefully watched in the building of it. Cams of this kind, if cut by the periphery of a cylindrical cutter, may do well with cutters of one particular size, but will fail with either smaller or larger cutters. In one shop where a great many of this kind of cam are made, it is found well to finish them to a former by a single pointed tool. This is good practice for quality, but needs too much tool sharpening and tool setting. In another shop the cylindrical cutter is used, but when the size of the cutter is materially reduced by resharpening, it is replaced. This is practical in that particular place, because the worn cutters may be used for other work after their sizes are so reduced that they no longer are fit to make good cams with on the machine. A fine engineer, now in Scotland, designed a machine to sequently change the centers of rotation in cutting this kind of cam, so that each arc is cut while the cam is being turned on the theoretical center of that arc. This machine worked finely, but it was necessarily elaborate in design, and had such precise points of construction that tool makers are scarce who are capable of getting all its points exactly correct. I have not seen a machine that can cut these cams of various sizes or of different centers of arc without special formers for each size and each shape.

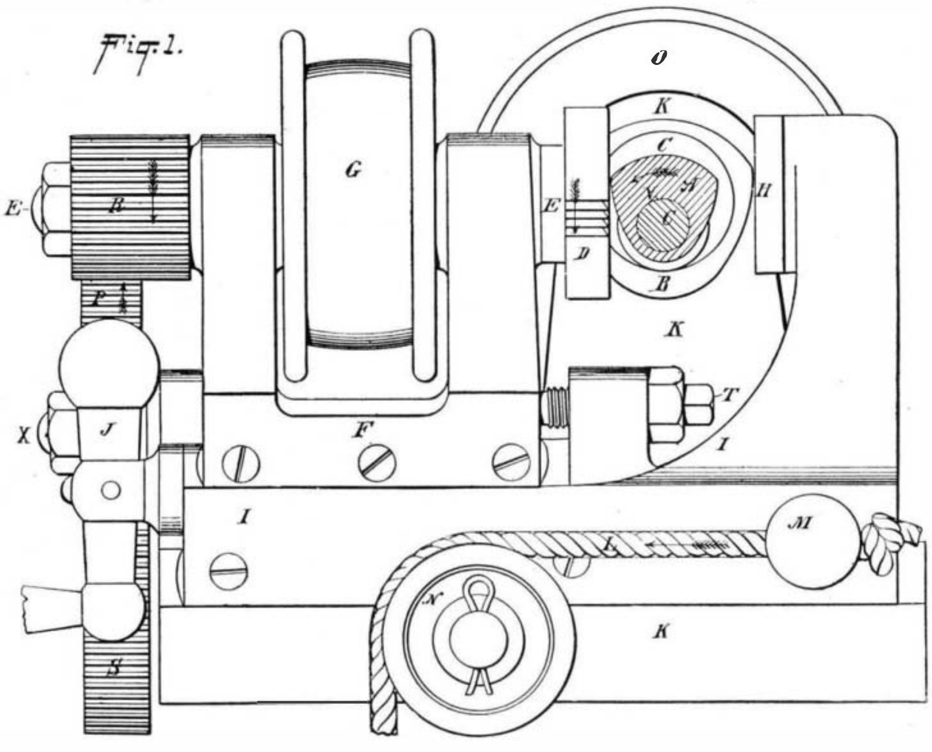
While these cams are very useful, they heretofore have been not so difficult to cut as difficult to keep precise to sizes and to uniform diameters in the same cam. The difficulty has not been from neglect in not having competent engineers to design, but in overcoming the effect of differing sizes of cylindrical cutters cutting with thei peripheries on an irregular rotating shape. As the cam turns from the smaller to the larger radius, a large cutter will meet the larger coming part sooner than a small one, and in descending the reverse of this is true. Of course these cams are generally mounted to rotate, while being cut, and arranged so that their mean centers are concentric to the spindles that carry them. But this, while it is a help, is but a partial cure at best.

Having given this problem some thought during my experience, I herewith submit a sketch of a machine that I believe will work, give accurate results, and produce more cams than any other method yet tried.

This machine, as sketched, indicates rather than designs many of the details; but the general plan is what is suggested. The details of construction would vary in each shop to harmonize with the practice of each shop.

In the sketches, A is the cam in operation, mounted on the spindle, C. In Fig. 1, the cam and its arbor are cut in section to indicate their relative positions to the center, V, of the spindle, C. B is the former, from which the cam in operation takes its shape. D is the cutter, mounted on the spindle, E. This spindle must be exactly square with the spindle, C, and the centers of both these spindles must be cut by the same horizontal plane. The cutter, D, also must be exactly flat on its face, must be large enough to more than cover the width being cut, and have teeth on its periphery as well as its face. This cutter, thus arranged, will not cut a shoulder against a hub that is perfectly square, and as this is, I believe, never necessary, it matters not. F is the headstock, adjusted by the screw and handle, J, and located by the stop, T. G is the pulley that drives the whole machine positively. H is shoe on the carrier, I. This shoe is of hard steel, and the plane on H that is in contact with the former, B, must be exactly perpendicular, or square to the center of the spindle, E, in all directions. The former, B, should also be of hard steel, ground to shape. It will be well if there be an oil cup fastened to the frame, K, and situated so that this former will continually pass through the oil. The carrier, I, is attached to the frame, K, by a common slide device, and through it the shoe, H, is held to the former, B, by a weight suspended from the cord, L, which operates about the wheel, N, and is fastened to the stud, M. On the upper side of I is a slide, to which the headstock, F, is attached, so that the motions of I are all communicated to F, and thus the cutter, D, is always at the same distance from the shoe, H; and because its cutting face is parallel to the face of this shoe, H, it must, if the stop, T, be rightly set and the former be correct in shape, cut correct cams.

Fig. 1.

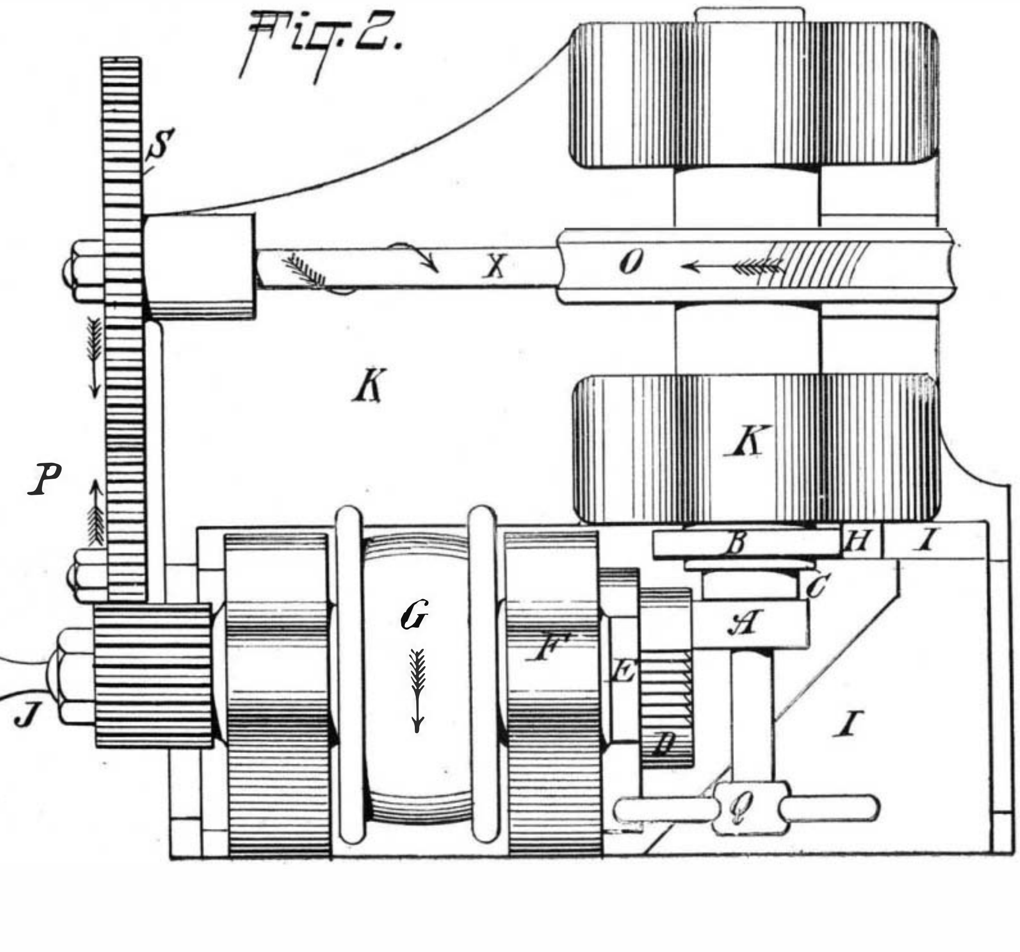


It will further be seen that the cutter, D, may be reduced by sharpening to any thickness, and the parallel effect with the face of H will not be impaired; and, further, that in adjustment, after sharpening the cutter, the only part to be moved will be the screw, T. By thus opposing the shoe, H, to the cutter, D, a much lighter weight is required to keep the contact against the former, B, than otherwise would be needed.

The cam is held to its place on the spindle, C, by the T-nut, Q, which fits a screw on the end of the arbor within the cam.

R is a pinion on the end of spindle, E. It engages the intermediate gear, P, and it is long enough on its teeth to permit the headstock, F, to be adjusted without affecting the engagement with this gear, P. The worm gear, O, rotates the spindle, C, being driven by a worm on the shaft, X. This shaft, X, is driven by the gear wheel, S, and connected to the spindle, E, by the intermediate, P, and the pinion, R.

Fig. 2.



Thus if the pulley, G, be driven by a belt, the cutter, D, will remove the metal on the cam, A, and the train of gears operated by the pinion, R, turns the shaft, X, and through the worm gear the spindle, C, which progressively brings the cam to be cut on the whole surface. The gears S and P are, by a mistake in drawing, made too thick in Fig. 1.

While this machine has never been made, my experience with the problem convinces me that it will fill the bill.

THE sun never sets on the soil of the United States. When it is 6 o'clock at Attoo Island, Alaska, it is 9:36 o'clock A. M. the next day on the eastern coast of Maine.