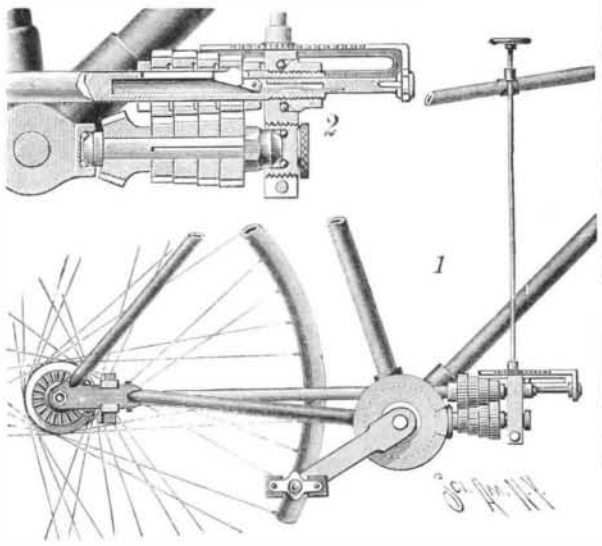
A NEW BICYCLE GEAR.

A differential gear, which may be readily applied to a safety bicycle, dispensing with the ordinary sprocket and chain, has been patented by Mr. Ernest H. P. Taylor, of No. 222 North Main Street, Waterbury, Conn. Fig. 1 in the illustration represents the application of the improvement to a machine and Fig. 2 shows a longitudinal section of the shifting mechanism for changing the speed. The gear may be made very light and strong and may be quickly and easily ad-



TAYLOR'S BICYCLE GEAR.

justed to drive the bicycle fast or slow as desired. On the end of the rear hub is a bevel gear wheel meshing with a pinion on the driving shaft, which extends horizontally forward above the crank shaft, to which it is connected by the differential gearing. The rear end of the drive shaft is supported in a ball bearing and its forward end is hollow, having a reduced extremity journaled in a ball bearing supported in a split hanger. An extension plate from the same support has an upturned flange, to which is bolted a slotted sliding rack, actuated by a pinion on the lower end of a shaft, on whose upper end is a wheel within easy reach from the saddle. The rack moves a rod sliding in the bore of the driving shaft, and on the inner end of the rod is a latch adapted to engage a recess in either one of four different sized gear wheels journaled loosely on the shaft, so that either one of such wheels will revolve with the shaft. The gears of this series form practically a cone gear, with the gears independent of each other, and they mesh with a cone gear on a short shaft supported in ball bearings just below, there being on the latter shaft a bevel pinion which meshes with a pinion on the pedal shaft. By turning the hand wheel the drive shaft is locked to either one of its four different sized gears, and is thus operated by a corresponding gear on the short shaft actuated by the pinion on the pedal shaft, to give a rapid motion with comparatively little power or a slower motion with correspondingly increased power. In this way the speed of the machine may be regulated to suit the strength and weight of the rider and as may be desired on account of the difficulties of the road.

DUPLEX LATHE FOR CRANKS.

We illustrate an exceptionally large duplex lathe completed by Messrs. Hulse & Co., of the Ordsal Works, Manchester, specially for dealing with marine crankshafts of the heaviest class, but suitable also for turning other large forgings and castings. For our engraving and the following particulars we are indebted to *Engineering*. It admits 12 feet in diameter and upward of 30 feet in length between centers, and is arranged so that four cutting tools may be in operation simultaneously, viz., two at the front and two at the back of the lathe. The sliding carriages are entirely independent of one another, in order that not only all may be traversed at different rates of feed, but any one or more may be surfacing while the others are sliding, and *vice versa*, and this in either direction.

The bed, which exceeds 50 feet in length, has four longitudinal box girders in pairs, united by numerous transverse box bars, and a large non-rotating steel guide screw is placed between each pair of girders, by means of which the front and back carriages are respectively traversed longitudinally without cross-straining.

The quadruple geared fast headstock has sixteen readily effected changes of speed, uniformly graduated, and the face plate chuck is 10 feet in diameter, cellular in form, of great strength, and externally geared at the back, cast steel jaws worked by independent screws being fitted in front for gripping the objects to be operated upon. The main spindle is of Siemens-Martin steel with hard gun metal adjustable bearings of square outline, the back bearing being multiple grooved for resisting, without undue friction, the end thrust.

The movable headstock has a large steel cylinder actuated by screw and worm and wheel for forcing the center into the work, and by handwheel direct on the screw for quickly moving in and out. It is adjustable along the bed by worm and wheel and rack and pinion, and is prepared to receive a special rest for turning and facing the flanges of crankshafts at the same time as the bodies are being operated upon.

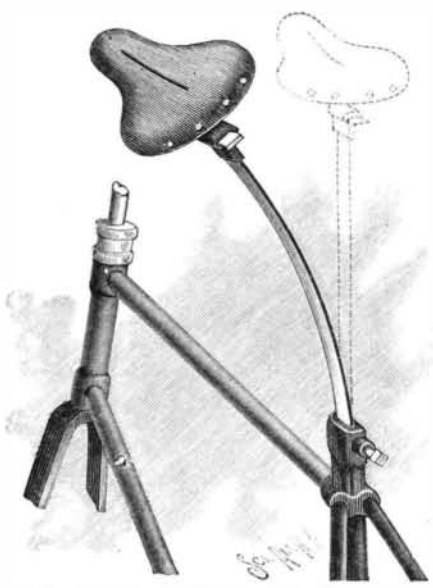
The sliding carriages, of which there are four, are each fitted with a rotating nut, reversing gear, and swing frame with change wheels, these latter not only imparting the various rates of feed longitudinally for sliding, but transversely for surfacing also. Rotary motion is transmitted to the "feed" mechanism of the carriages from the main spindle of the fast headstock by means of vertical and horizontal steel shafts and bevel gear, affording constant (not intermittent) feed traverses both for sliding and surfacing.

There are provided two compound slide rests and two special narrow rests for turning the crank pins and inside webs, one of each kind being interchangeable between the two front carriages, and one of each between the two back ones; the compound rest at the back has an inverted V slide in order to satisfactorily resist the upward pressure of the cut and prevent "jarring."

The lathe, which is one of the largest of its type ever made, is very massive in all parts, and well proportioned, and weighs upward of 100 tons.

A NOVEL SUPPORT FOR VELOCIPEDE SADDLES.

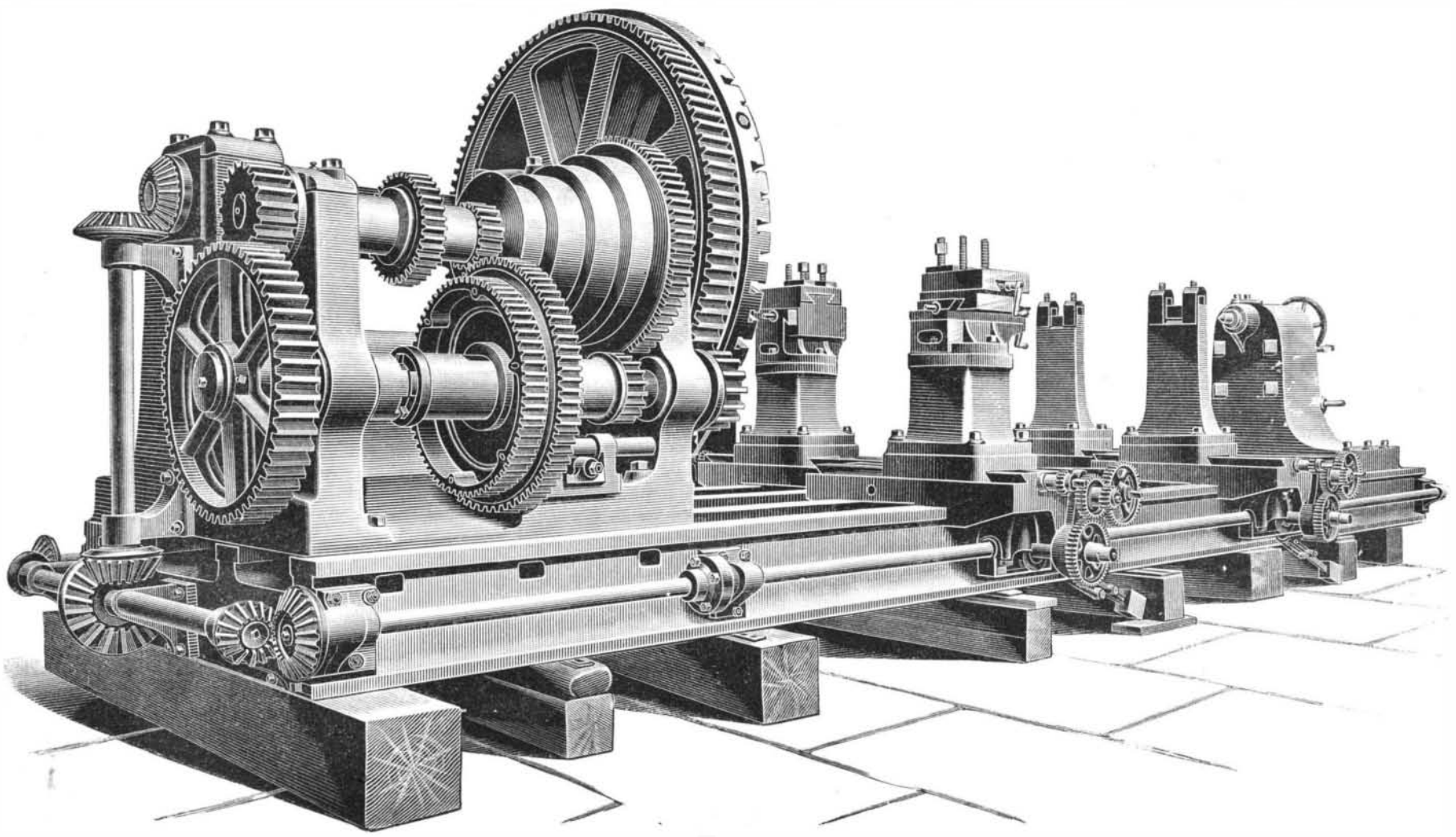
In saddles for velocipedes, unicycles, etc., it is sometimes desirable to permit the swaying of the body of



HARPER'S VELOCIPEDE SADDLE.

the rider from one side to the other, to shift the center of gravity, and thus enable the machine to be more readily turned and steered. By the use of the saddle-supporting stem shown in the illustration, which may be conveniently applied to any saddle and to any machine, this object is readily attained. The improvement has been patented by Mr. Lewis W. Harper, of New York Mills, Minn. The stem is of spring material, so that it may sway or swing laterally, as indicated by the dotted lines, although it has sufficient stiffness to hold it normally in vertical position. At its lower end it is adjustably held in a socket by means of a set screw, whereby the height of the saddle may be regulated, and on its upper end is a horizontally slotted head to receive the saddle spring, which is secured to the head by a set screw. The bending of the stem is effected by the rider throwing his weight to one side or by pulling himself to one side by his grip on the handles of the machine.

OF the 3,559 vessels using the Suez Canal in 1892, 2,581 were British. France fell from second to third place in the list, with 174. Germany follows England, and only 292 ships of that nation passed through the canal. Two American vessels used it.



DUPLEX LATHE FOR MARINE CRANKSHAFTS.