Sliding over the central portion of the sleeve A, which is there of slightly reduced size and of circular section, is the follower B, which, when thrown forward, to the right, presses on the disks and forces them against the flange referred to, at the other end of the sleeve A. A collar C is screwed on the left-hand end of the sleeve A, and forms the abutment against which the toggles act when applying pressure to the disks. The two abutments being thus attached to the opposite ends of the sleeve A, the re-action of the end thrust between them is entirely absorbed by the sleeve, and is not transmitted to either shaft. The collar C is also utilized to effect the adjustment of the clutch by screwing or unscrewing it on the sleeve A. It is slit longitudinally at one point, and its ends drawn together by the set-screw P, which, when loosened, permits the collar to be turned for adjustment and when tightened locks it securely in place.

A second series of disks, of the form shown by Fig. 5, and designated as the *external* disks, are placed alternately with the internal disks and by their peripheries engage with the box E.

The external disks are thus compelled to rotate with the box E, but, if not frictionally engaged with the internal disks, communicate no motion to the other parts of the clutch. The internal disks, on the other hand, engage by their centres with the sleeve A, and rotate with it, but have no direct connection with the box E. If, however, the two series of disks are forced together by the follower B pressing against them and forcing them toward the flange at right-hand end of the sleeve A, thus gripping the entire stack of disks between the two pressing surfaces, the two series of disks are locked together by frictional engagement and rotate in unison as one solid piece.

In order to obtain the longitudinal pressure required to lock the disks together two or more toggles are employed, as shown in Fig. 3. One end of each toggle is pivotted to a projecting boss on the adjusting collar C, and the other to a similar projection on the rear of the follower B. The toggles have a positive action in *both directions*, so that they not only force the follower B forward when applying pressure, but also positively withdraw it when the pressure is released. The toggles are connected by the grooved sliding collar F, operated in the usual manner by a forked lever. The toggle action dispenses with all need of any end pressure on this lever, so that, excepting at the mere moment of transition from one position to the other, there is no friction and consequently no wear upon either the collar F or the forked lever which actuates it.

When the clutch is in engagement and is transmitting power all of its parts are rigidly locked together and revolve in unison without friction, noise, or loss of power. When disengaged one of the shafts is at rest, and the other, preferably the shaft S_1, is in motion. To provide the proper bearing between the stationary and the moving parts the right hand end of the sleeve A is provided with a long hub, having a bronze bush G fitting nicely on the shaft S^1, and within which the latter runs, the frictional contact being thus between the iron shaft and the bronze bushing. Special provision is made for the proper lubrication of the journal thus formed, as well as for the other part, of the clutch which require lubricating. When a clutch is disconnected, so that one portion is at rest and the other in motion, the bushing G thus receives all of the resulting friction and wear, and it is so constructed as to admit of easy replacement in case of wear, by which means the proper alignment of the parts is easily and accurately restored.

As shown in Fig. 3, the grooved collar F is in the forward position and the toggles depressed, thus forcing the friction disks into contact and locking all the parts of the clutch in engagement, so that the motion of the shaft S1 is transmitted through the box E, the disks D, and the sleeve A, to the other shaft S^2. In like manner, if the latter be the driver, motion will be transmitted in the reverse order through the clutch to the other or driven shaft S1. The position of the several parts when the collar F is retracted and the toggles elevated, so that the clutch is disconnected, is clearly shown by Fig. 6.

Fig. 6 shows the clutch as applied to a pulley, its purpose being to effect the engagement or release of the pulley and shaft, as desired. Referring to Fig. 6, S is the shaft to which it is desired to connect the pulley H by means of a clutch, power being transmitted either from the pulley to the shaft or from the shaft to the pulley, as required. In this case the several parts of the clutch are identical in all respects with those of the cut-off coupling shown by Fig. 3, and already fully described, except that the hub of the box E is lengthened and is turned to fit into the hub of the wheel or pulley H, which latter is bored to fit accurately over the extended hub of the box and is then secured thereto by the key N and a set-screw. The collar I, fastened by a set-screw in the usual manner, is then secured on the shaft in the position shown, and serves to preserve the longitudinal position of the pulley H and its attached parts. As shown in Fig. 6, the collar F and their toggles are in their retracted position, thus withdrawing the follower B and releasing the disks, so that the clutch is disengaged and no power will be transmitted through it. It will thus be seen that the clutches shown in Fig. 3 and 6 are identical in all essentials, and that the same device, with slight modification, is available either for a cut-off coupling for shafting, or as a friction clutch for pulleys.

The construction and action of the several parts, although requiring a somewhat long description to explain clearly, are few in number and simple in operation. All of the parts are of metal, no wood or other soft material being employed. The clutch is entirely free from collar friction or end-thrust, and runs without noise or loss of power. The friction surfaces are all flat sheet metal, of great durability and easily and cheaply renewed. The adjustments are very simple and quickly made The working parts are all assembled upon a central sleeve, and do not require to be taken apart in order to fit the clutch in position, so that it can be easily and quickly applied. It embodies all of the essentials of an efficient and durable clutch, and avoids features which have been found unsatisfactory and liable to rapid wear.—*Ex.*

SIMPSON'S GEAR MOULDING MACHINE.

The advantages of a machine for moulding all classes of gears —spur, bevel, and miter, mortised or worm, in all forms and in all sizes—are too well known to need comment. The use of such a machine will save a large outlay in patterns, and enable the use of a gear best suited to the purpose, instead of making a compromise, which is often done to save the price of patterns. The engraving presented herewith represents a machine for the purpose named.

In using this machine the moulder simply adjusts the index pin to a series of holes on index cylinder, corresponding to the number of teeth required. The diameter is easily adjusted by turning the handle on end of the spindle arm, which moves the tooth block carriage to any desired radius; stops are then adjusted so as to preserve the radius while the wheel is being made. By a quadrant slot on tooth block the latter may be turned so as to describe any angle required on the face of the wheel—spur, bevel, or miter—as the case may be. When teeth on the tooth block are rammed up the moulder moves the spindle arm around until the pin enters the next hole, when the tooth block is again lowered until the stop on the square shaft brings it to its proper place. The same operation is repeated until the gear is completed.

Everything about the machine is plain, simple, and straightforward; no worm wheel or compound gearing about it to bewilder with their complexity. Any mechanic with only limited mechanical ability can easily understand the machine and learn how to work it almost at the first glance.

The holes on index cylinder are accuarately spaced and drilled on machines specially made for that purpose. Through this agency the gear to be made must leave the sand with special accuracy.

The machine, we are informed, has been tested by experts, and its operation fully endorsed.—*Ex.*

THE bayaderes of India, who possess the most perfect figures of any women of any country on earth, have a much more healthful and charming device than any Europeans. Their corsets are formed out of the bark of a Madagascar tree, on a principle which permits them every freedom of movement in brerthing and in any form of exercise. These are wonderful productions of ingenuity. The colour resembles the skin to a remarkable degree, and the material is so fine that the most delicate touch will hardly distinguish it from human flesh. Once made, these corsets are seldom removed, the bayaderes even sleeping in them. They thus preserve astonishingly beautiful figures to an advance age, without pain or discomfort to themselves, while we, who boast ourselves intellectual and civilized, torture with out beautifying ourselves.—*Ex.*