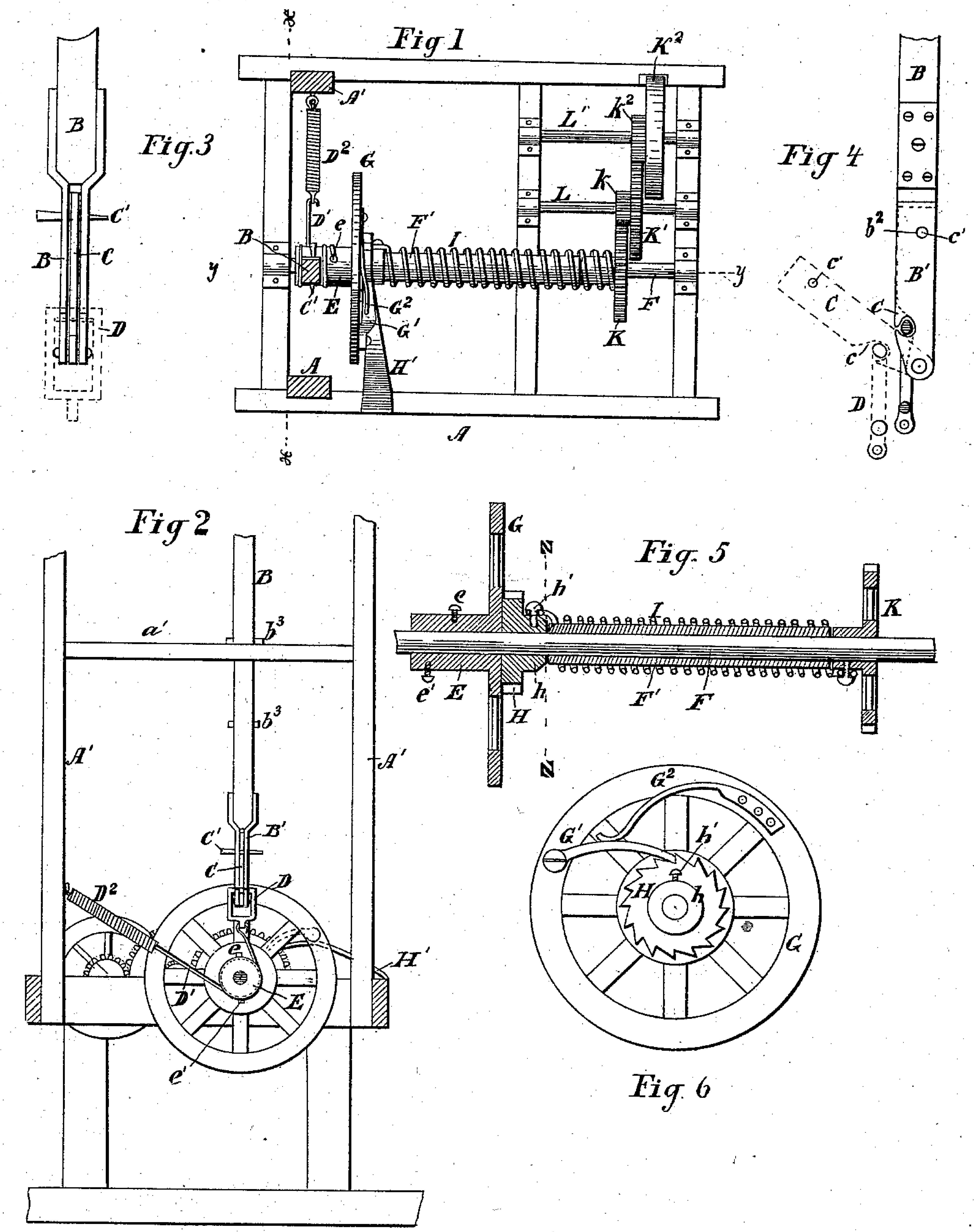
(No Model.)

W. H. RYTHER.

DEVICE FOR CONVERTING MOTION.

No. 258,129. Patented May 16, 1882.



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DEVICE FOR CONVERTING MOTION.

SPECIFICATION forming part of Letters Patent No. 258,129, dated May 16, 1882.

Application filed February 18, 1881. Renewed March 15, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. RYTHER, of Northville, in the county of La Salle, in the State of Illinois, have invented certain new and useful Improvements in Machinery for Converting Motion, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my improved machinery. Fig. 2 is a section on the line *x x* in Fig. 1, being in effect an end elevation with one end of the lower part of the supporting-frame removed. Fig. 3 is a detailed elevation of the lower part of the reciprocating pitman, the point of view being the same as in Fig. 2. Fig. 4 is a detailed side elevation of the pitman, showing the device for automatically disconnecting the pitman from the rotating machinery. Fig. 5 is a vertical section on the line *y y* in Fig. 1. Fig. 6 is a vertical section on the line *z z* in Fig. 5, looking to the left.

The same letters denote the same parts in all the figures.

My invention relates to machinery for converting reciprocating into rotary motion, and principally, though not exclusively, to such machinery when employed in connection with windmills. Usually heretofore such machinery has been driven by the downstroke as well as the upstroke of the pitman attached to the windmill, the employment of the former being not only attended with a jarring of the machinery, and consequent disagreeable noise, but also with a loss of power from the reversal of the direction in which the force is applied, besides involving constant danger of entangling the flexible connections and bending such as are rigid. In the use of the rotary mechanism for shelling corn and similar purposes, it often happens that some obstruction gets into the corn-sheller and stops it, the result being to break some part of the machinery unless somebody is at hand to disconnect it.

A leading object of my invention is to remedy these defects; and to this end it consists in mechanism for producing a rotary motion by the upstroke of the pitman, such mechanism being unaffected by the downstroke.

It further consists in mechanism connecting the pitman with the rotating mechanism of such a nature as to be automatically disconnected by any obstruction beyond a predetermined degree of resistance, and thus to avoid the serious loss of time which is involved in continually watching the machinery while it is in operation.

My invention further consists in the arrangement of a coiled spring around the driving-shaft of the rotary mechanism, one end of the spring being affixed to the shaft and the other to a wheel which turns independently of the shaft, and is operated by the reciprocating pitman for the purpose of turning the shaft by the coiling of the spring.

My invention further consists in the several devices and combinations of devices subsidiary to the ends already mentioned, which will be fully described hereinafter, and definitely pointed out in the claims.

In the drawings, A denotes the frame in which the machinery is supported, provided at one end with the upright gallows A′, whose cross-beams *a′* serve as guides for the pitman B, which passes through them and receives an upward and downward motion from a windmill or other analogous source of power. The pitman terminates at its lower end in a pair of upright parallel bars, B′, between which at their lower ends, at *b′*, is pivoted one end of a bar, C, of length and thickness adapted to passing freely but not loosely between the bars B′. When the machinery is in operation the pivoted end of C is lowest, and the bar C is held upright between the bars B′ by a pin, C′, passing through the hole *c′* in C and the corresponding holes, b^2, in the bars B′. This position is shown in Fig. 3. The perforations are a little nearer to one edge of the bars than to the other. A little way from its pivoted end, and on the edge which is farthest from the hole *c′*, the bar C has a notch, *c*, in which is hooked one end of a cord or chain, D, which, when the pitman is lowest, passes under and about half-way around a drum loosely mounted on the main driving-shaft F, and is made fast at its other end to a pin, *e*, projecting from the circumference of E. A groove in the circumference of E aids to keep the cord in its place. Obviously the lifting of the pitman will tend to turn the drum E and the inertia of the drum will be more or less of a strain on the pin C′, so that the bar C will be a lever having its fulcrum at the pivot b′, one of the opposing forces being applied where the cord D bears on the notch e, and the other where the pin C′ supports the upper end of C. By making the pin C′ of a strength limited to that degree which is requisite for the ordinary work of the machinery, so that when the resistance exceeds that degree the pin will break, the result will be that any obstruction in the corn-sheller or other analogous machinery which offers a resistance greater than that of the material on which the machinery is operating will remove all resistance to the pull of the cord D on the notch, so that the bar C will be drawn down, as shown by the dotted lines in Fig. 4, and so as to hang entirely below the pivot b′, the cord D slipping out of the notch e, and the pitman which applies the moving-power thus becoming entirely disconnected with the machinery to be moved. Of course if the point where the cord D bears on the bar C is farther on one side of a line parallel to the longer edges of the bar and passing through the pivot than the point of strain on the pin C′ is on the other side of such a line, the resisting-power of the pin will be proportionately reduced, and vice versa. On the opposite side of the periphery of E is a pin, e′, to which is fastened one end of a cord or chain, D′, which passes under E in a groove parallel to that of the cord D, and is fastened at its other end to a spring, D^2, which is itself made fast at the farther end to one of the upright timbers of the gallows A′ at a point far enough above the drum E to hold the cord D′ tight against the under side of E. The tension of this spring is sufficient, when not resisted by the upstroke of the pitman, to turn the drum and draw down the pitman to the full extent allowed by the stops b^3 on the latter. A weight suspended from the cord D′ might serve the purpose of the spring; but the latter is preferable as keeping the cord more surely in place.

At its inner end the drum E carries a wheel, G, which turns with it. To the felly of this wheel, on its inner face, is affixed one end of a pawl, G′, the other end of which engages with the teeth of a ratchet-wheel, H, which, like the drum E, has a loose bearing on the main shaft F, and is independent of E. A spring, G^2, also attached to the felly of G, holds the pawl G′ from oscillating when it is turned upside down by the revolution of G, and thus keeps it always in a position to engage with the teeth of the ratchet-wheel. These teeth point in the direction opposite to that in which the drum E is turned by the upstroke of the pitman, so that the pawl G′ turns the ratchet-wheel during the upstroke and slips back over the teeth during the downstroke. A stiff pawl, H′, preferably made from a plate of spring-steel, engaging with the teeth of H, prevents it from turning back when the pawl G′ has ceased to turn it forward. This pawl H′ is detachably set on the main frame in such a position that its forward end is a little back of the uppermost tooth, and the pawl G′ is set at such a point on the felly of the wheel G as to rest just above H′ at the end of the downstroke. A hollow nave or flange, h, projects inwardly from the wheel H, and on the convex surface of this is fastened, at h′, one end of a coiled spring, I, which surrounds the main driving-shaft F, and is fastened at its farther end to the farther end of the shaft. It is found preferable in practice not to arrange this spring in direct contact with the shaft itself, inasmuch as the shaft may advantageously be made of steel and of a circumference so small as not to afford a surface of sufficient extent for a suitable spring to close on without danger of kinking or becoming entangled. I therefore surround the shaft F with a sleeve, F′, of considerably greater diameter, which rests loosely on it and is large enough for the spring to coil around. By this device I also avoid the wear of the shaft which would result from the friction of the spring on it, the wear of the sleeve, which may be made of gas-pipe or other inexpensive material and easily replaced when worn out, being a matter of comparatively little importance. The sleeve F′ does not extend the whole length of that part of the shaft around which the spring is coiled, the part at which the farther end of the spring is fastened being covered by a separate short sleeve, F^2. The spring is fastened directly to a pin, f, which passes through the sleeve F^2 and is set in the shaft itself, so that the sleeve F^2, unlike F′, is rigidly connected with the shaft. Just beyond the sleeve F^2 a gear-wheel, K, is rigidly set on the shaft F, so as to turn with it. The teeth of K mesh with those of a pinion, k′, rigidly set on an independent shaft, L, which is supported in bearings in the frame A behind the main driving-shaft F. The shaft L also carries a large gear-wheel, K′, whose teeth mesh with those of a second pinion, k^2, which is rigidly set on a third independent shaft, L′, supported in similar bearings. The shaft L′ carries a fly-wheel, K^2. This set of gearing is adapted to machines of larger size. For the smaller machines I find it preferable to dispense with the third shaft and to put the fly-wheel on the shaft L instead of the gear-wheel K′. The shaft which carries the fly-wheel, whether L or L′, is to be connected in any suitable way with the machinery to be operated.

The turning of the ratchet-wheel H by the motion communicated from the pitman through the drum E, wheel G, and pawl G′ at first results in coiling the spring I more tightly around the sleeve F′. When the tension of the spring becomes strong enough to overcome the inertia of the machinery to be driven by the main shaft F the continued turning of H will turn F by reason of the attachment of the other end of the spring to it. When the upstroke ends the forward impulse of the drum E necessarily ceases, and the tension of the spring D^2 necessarily turns it back again; but by reason of the arrangement of the pawls G′ and H′ the ratchet-wheel H is prevented from turning back, the tension of the spring I does not relax, and after a few strokes of the pitman the inertia of the machinery, especially with the aid of the fly-wheel K^2, will be sufficient to maintain a uniform revolution of the crank or other connecting device communicated altogether from the upstrokes of the pitman.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In machinery for coverting motion, a shaft arranged to turn in bearings, a wheel loosely mounted on the shaft, mechanism connecting the wheel with a reciprocating pitman, and a coiled spring surrounding the shaft, and fastened to it at one end and to the wheel at the other, all in combination, substantially as and for the purpose described.

2. The revolving shaft F, wheel H, loosely mounted thereon, reciprocating pitman B, mechanism connecting the pitman with the wheel, sleeve F′, arranged on the shaft, as described, and coiled spring I, surrounding the sleeve, and fastened at one end to the wheel H and at the other to the shaft, all in combination, substantially as and for the purpose described.

3. The pitman B, shaft F, drum E, loosely mounted on F, cord D, connecting F and E, and cord D′ and spring D^2, connecting E with a fixed point, all in combination, substantially as and for the purpose described.

4. The shaft F, revolving drum E, loosely mounted thereon, flexibly connected with a reciprocating pitman and provided with a device for turning it back when the pull of the pitman ceases, wheel G, provided with the pawl G′ and the spring G^2, ratchet-wheel H, mounted on the shaft F, and pawl H′, all constructed, arranged, and operating in combination, substantially as and for the purpose described.

5. The pitman B, slotted at its lower end and perforated at b^2, in combination with the connecting-bar C, arranged to pass through the slot, pivoted in the lower end thereof, perforated at c', and provided with the notch c, substantially as and for the purpose described.

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Witnesses:

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