A. H. EHLE.

INTERNAL COMBUSTION LOCOMOTIVE.

APPLICATION FILED OCT. 23, 1909.

951,062.

Patented Mar. 1, 1910.

2 SHEETS—SHEET 1.

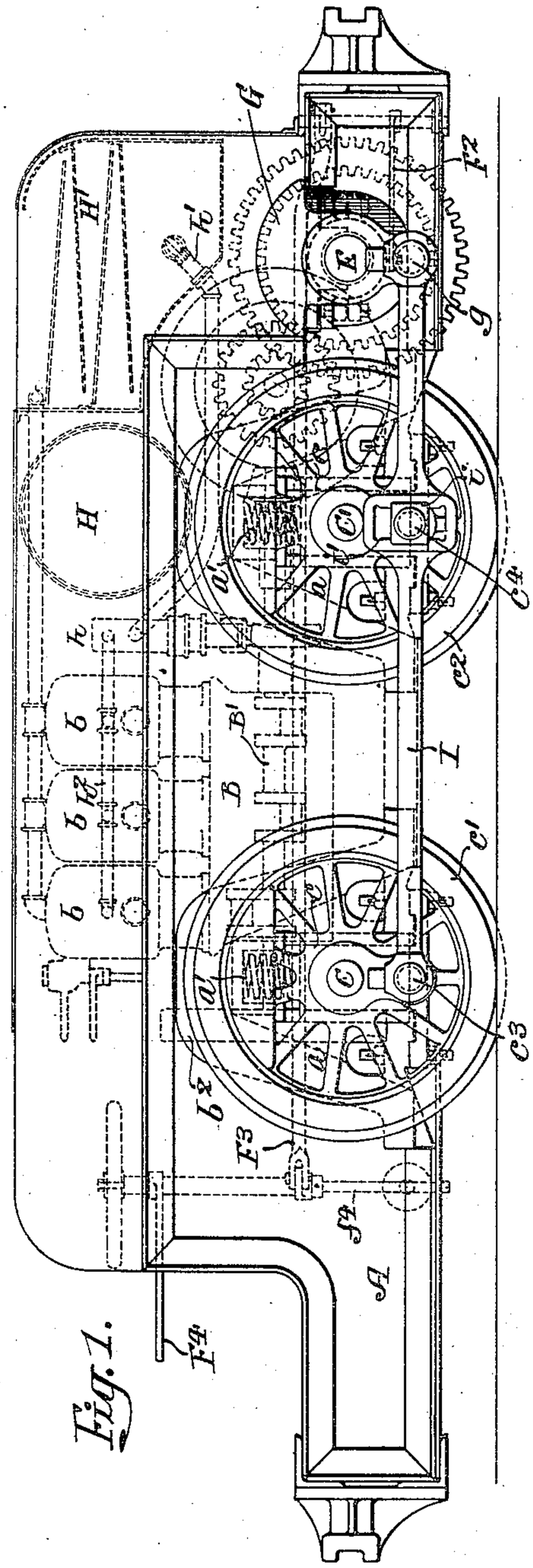

Fig. 1.

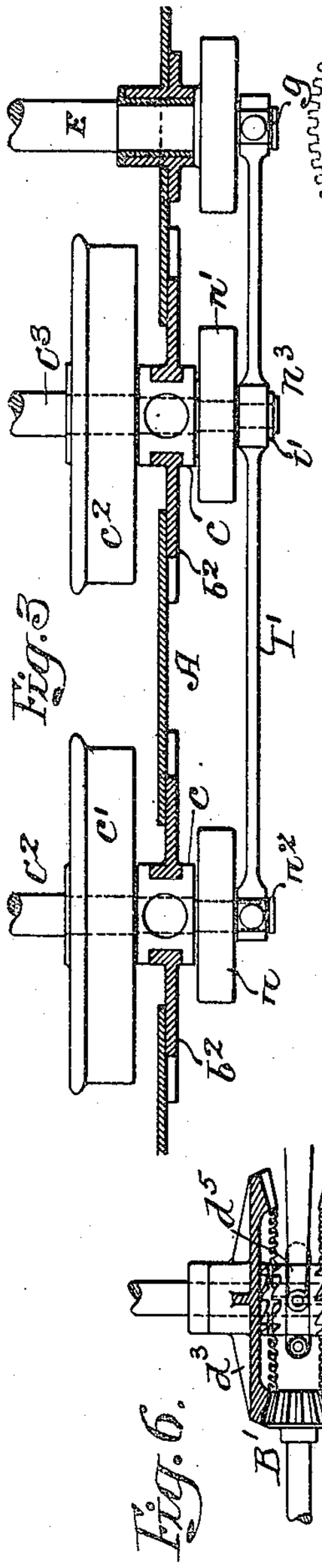

Fig. 3.

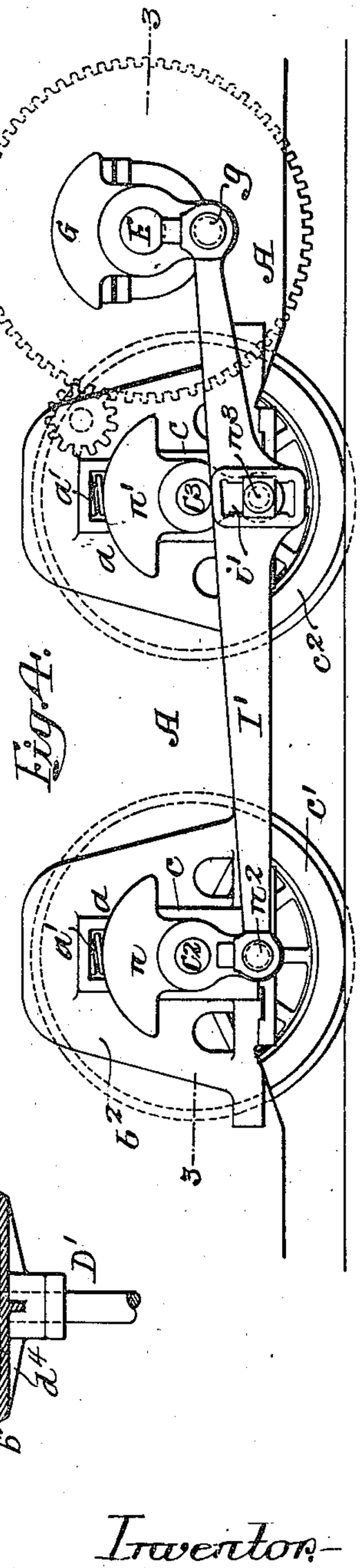

Fig. 4.

Fig. 6.

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2 SHEETS—SHEET 2.

Fig. 2.

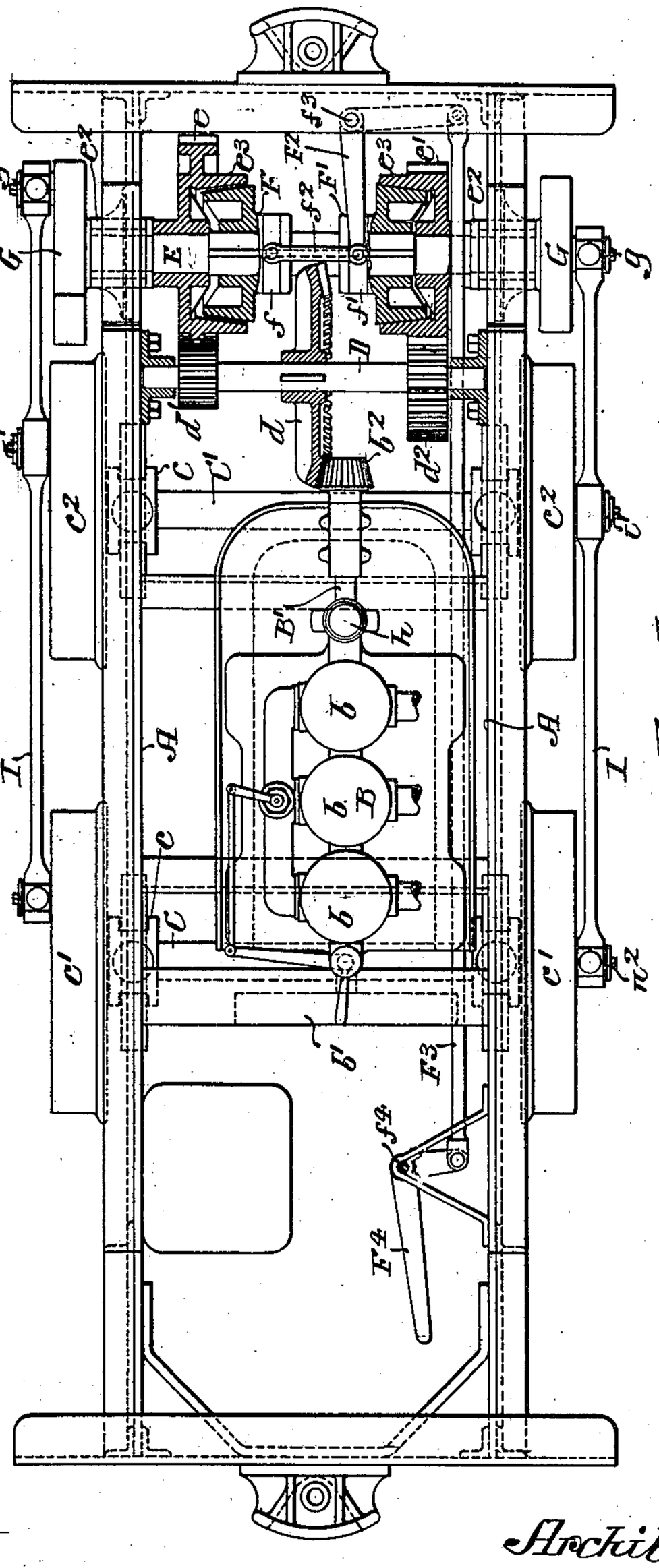
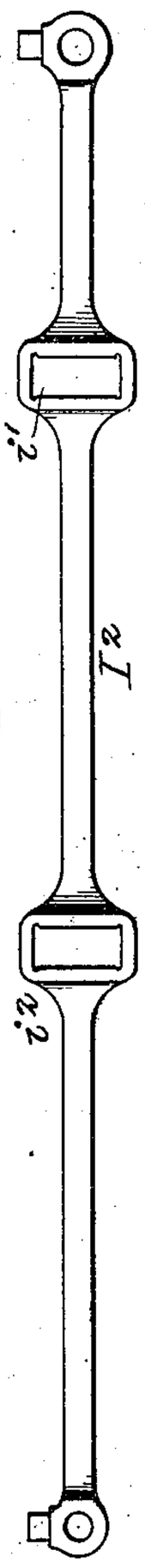


Fig. 5.



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UNITED STATES PATENT OFFICE.

ARCHIBALD HYDE EHLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO BALDWIN LOCOMOTIVE WORKS, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

INTERNAL-COMBUSTION LOCOMOTIVE.

951,062. Specification of Letters Patent. Patented Mar. 1, 1910.

Application filed October 23, 1909. Serial No. 524,258.

To all whom it may concern:

Be it known that I, ARCHIBALD H. EHLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Internal-Combustion Locomotives, of which the following is a specification.

One object of my invention is to spring support the frame of the locomotive on two or more axles and to drive the axles by a rod directly connected to a driving shaft and axles on each side of the locomotive, and a further object is to so construct the mechanism that the driving shaft can be arranged close to the axle, making a close coupled locomotive, and a still further object of my invention is to construct the locomotive with the crank shaft of the engine arranged longitudinally and geared with the transverse driving shaft through clutch mechanism.

In the accompanying drawings,—Figure 1, is a side view of my improved locomotive; Fig. 2, is a plan view partly in section; Fig. 3, is a sectional view on the line 3—3 Fig. 4; illustrating a modification; Fig. 4, is a side view of a modification illustrated in Fig. 3; Fig. 5, is a view of a modified form of connecting rod; and Fig. 6, is a view of a modification of the clutch mechanism.

A is the frame of the locomotive of the type used in mines and in yards of manufacturing establishments, to shift cars from one point to another. It will be understood that the locomotive may be used for any purpose without departing from the essential features of the invention. Carried by the frame A is the engine B of the internal combustion type, having in the present instance three cylinders b, b, b, a crank shaft B′, the crank shaft being arranged parallel to the longitudinal line of the frame of the locomotive. The engine in the present instance is arranged on one side of the center of the frame, but it will be understood that the engine can be located directly in the center in some types of engines, if desired.

C—C′ are the axles, mounted in boxes c—c adapted to pedestals a—a in the frame A of the locomotive. Between the upper end of the pedestals and the boxes are springs a', so that the frame is yieldingly supported on the axles.

c'—c^2 are the driving wheels mounted respectively on the axles C—C′.

The engine shaft B′ has at one end a fly wheel b' and at the opposite end a beveled gear wheel b^2 which meshes with a beveled wheel d on a transverse shaft D adapted to suitable bearings in the frame. This shaft has two pinions d'—d^2 of different diameters, which mesh with gear wheels e—e' respectively. These two wheels are also of different diameters. The gear wheels e—e' are loosely mounted on a transverse driving shaft E adapted to bearings e^2 in the frame of the locomotive, and each wheel has an extended internal friction face e^3. Adapted to slide on and turn with the shaft are two clutch sleeves F—F′, each clutch sleeve having a beveled face in the present instance, which may be forced into contact with the friction face e^3 of either of the wheels e—e'. Each sleeve is grooved to receive the rings f—f' respectively, which are connected together by links f^2.

F² is a bell crank lever pivoted at f^3 to the frame and connected to the link f^2 and to the ring f', and this lever is also connected by a rod F³ to an operating lever F⁴ pivoted at f^4 within easy reach of the operator, so that when this lever F⁴ is shifted the clutch sleeves can be either moved into mid position free of either of the wheels e—e', or moved in contact with the wheel e' or the wheel e, depending upon the speed desired.

On each end of the shaft E are crank disks G having crank pins g, and on the wheel c' is a crank pin c^3.

I—I are connecting rods, one rod being mounted on each side of the locomotive and connected at one end to the shaft E, and at the other end to a pin c^3 on the wheel c'. On the wheel c^2 is a pin c^4 which carries a box i adapted to ways in a yoke i' formed in the rod I, so that while both wheels c'—c^2 are driven by the single connecting rod they are free to move vertically independently of each other and of the shaft E which is mounted in fixed bearings in the frame, without binding.

In the present instance H is a gasolene reservoir and H′ H′ are the water cooling trays connected through a pump h and pipes h' and h^2, to the water jackets of the several cylinders.

In Figs. 1 and 2 I have shown the driving wheels on the outside of the frame of the locomotive, but in Figs. 3 and 4 I have

shown the wheels on the inside of the frame, the axles C^2 and C^3 being extended beyond their boxes *c*. On the axles are crank arms *n*—*n'*, provided with pins n^2—n^3 respectively. The crank pin *g* of the driving shaft is connected with the crank pin n^2 by a connecting rod I' which has a yoke *i'*, similar to the yoke of the locomotive illustrated in Fig. 1; by this construction the two axles are free to move independently of each other in a vertical direction. In this instance it will be noticed that the shaft E is above the line of the axles C^2 and C^3, to allow for a larger gear wheel with a given diameter of driving wheel, whereas in Fig. 1 the shaft E is on a line with the axles. The position of the shaft E in respect to the axles is immaterial, and by the construction shown the shaft can be arranged as close to the driving axles as the wheels will allow, making a very compact locomotive which is especially applicable for use in mines and other places where space is an object.

The engine illustrated in the drawings is of the reversing type, and where a non-reversible engine is used I preferably use the reversing gearing b^2, d^3 and d^4 illustrated in Fig. 6, with clutch mechanism d^5 to clutch one or the other of the gears d^3, d^4 with the shaft. The mechanism can be readily actuated from the operator's seat.

While I have shown in Fig. 1, a locomotive with four driving wheels, it will be understood that the number of driving wheels may be increased by simply connecting the crank pin by separate rods to cranks on the other driving wheels, or a rod I^2 may be used, as shown in Fig. 5, having two yokes *i'*, i^2, adapted to receive the crank pins of two intermediate axles.

I claim:

1. The combination in a locomotive of an engine, a transverse driving shaft at one end of the locomotive and geared to said engine, said driving shaft having crank pins, two driving axles mounted in the frame of the locomotive, wheels carried by the axles, crank pins on each axle, rods connecting the crank pins of the transverse shaft with the crank pins of the axles, the crank pin of the intermediate axle having a box adapted to slide in a yoke of the rod, so that the two axles are free to move vertically independently of each other.

2. The combination in a locomotive of a frame, an engine mounted thereon having a crank shaft in a longitudinal line with the frame, axles mounted in the frame, an intermediate shaft geared to the said crank shaft of the engine, a clutch shaft, gear wheels loosely mounted on the clutch shaft, pinions on the intermediate shaft with which said gears engage, clutch sleeves arranged to engage the gear wheels of the clutch shaft, means for shifting said sleeves, wheels on the axles, crank pins on the axles, crank pins carried by the clutch shaft and a connecting rod on each side of the locomotive connecting the several crank pins.

3. The combination in an internal combustion locomotive of a frame having pedestals, two axles having boxes mounted in the pedestals, wheels on the axles, a transverse clutch shaft mounted in bearings at one end of the frame, crank pins on the axles and on said shaft, rods connecting the crank pins of the shaft with those of the axles, the crank pins on the intermediate axle having boxes and each rod having a yoke in which the boxes slide, so that the two axles can move in a vertical direction independently of each other, springs mounted between the ends of the pedestals and the boxes, an internal combustion engine mounted on the frame and having a longitudinal crank shaft, an intermediate shaft geared to said crank shaft and having two pinions of different diameters, gear wheels loose on the clutch shaft, one of said wheels gearing with one pinion and the other gear wheel gearing with the other pinion, two clutch sleeves adapted to slide on but turn with said clutch shaft, lever mechanism therefor and a coupling link connecting the clutch sleeves.

4. The combination in a locomotive of a frame, two axles mounted in the frame and springs supporting the frame on the axles, a driving shaft having crank pins, crank pins on the axles, a single connecting rod on each side of the locomotive having a yoke, boxes adapted to the yoke, the crank pins of the driving shaft and the crank pins of the axles farthest from the said shaft being rigidly coupled to the rods, the crank pins of the other axles being adapted to the boxes sliding in the yoke.

5. The combination in a locomotive of a frame, a driving shaft mounted in fixed bearings on the frame, two driven axles, springs mounted between the axles and the frame, cranks on the driving shaft and on the driven axles, a single connecting rod on each side of the locomotive, said connecting rods having an intermediate yoke, the crank of the driving shaft and the crank of the axle farthest from the shaft being rigidly coupled to the rods and the intermediate crank being coupled to the rods at the yoke, so that the said intermediate axle will be free to move vertically independently of the rods.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ARCHIBALD HYDE EHLE.

Witnesses:
WM. E. SHUPE,
WM. A. BARR.