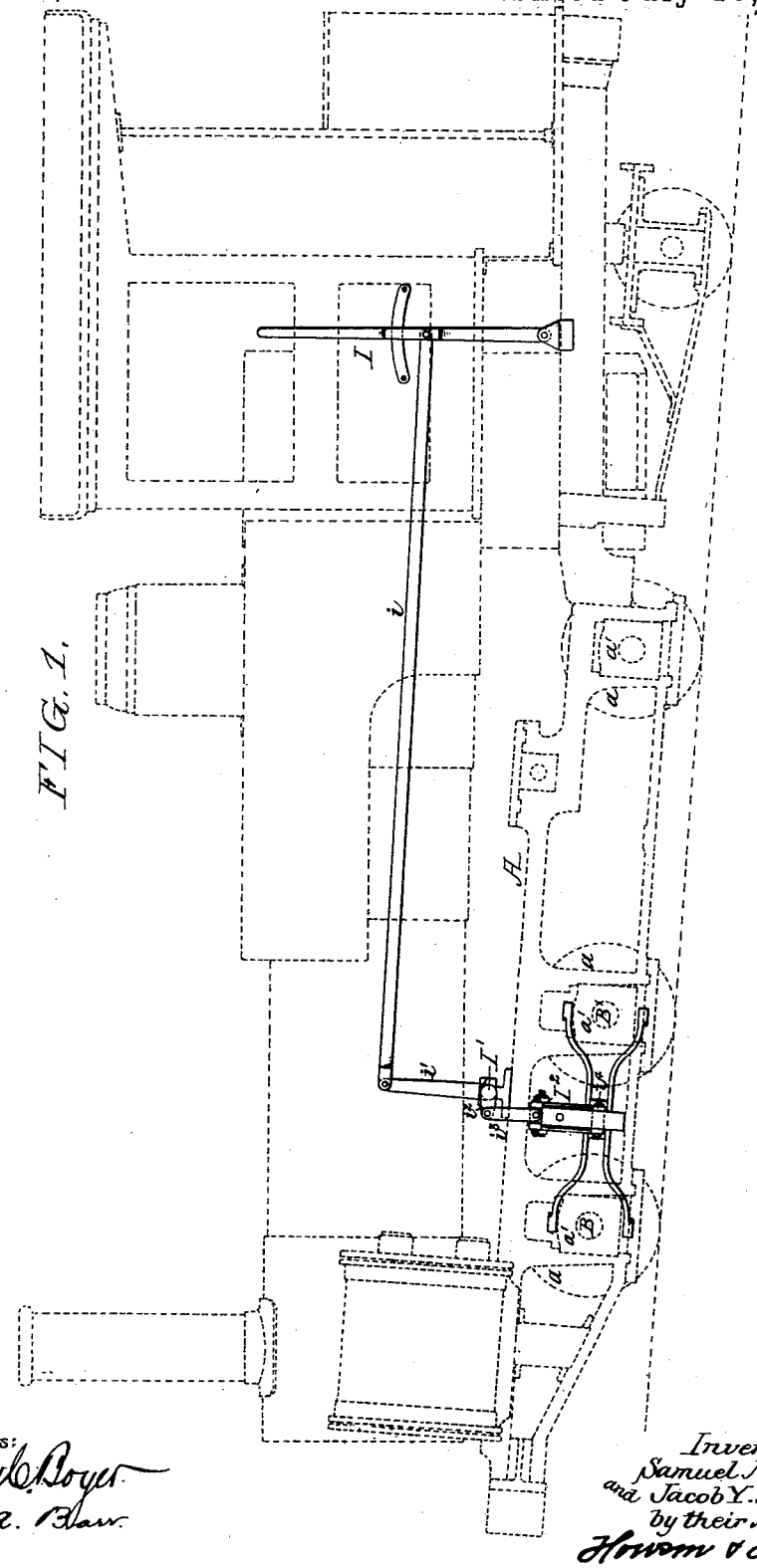
(No Model.) 4 Sheets—Sheet 1.

S. M. VAUCLAIN & J. Y. McCONNELL.

COMBINED RACK AND ADHESION LOCOMOTIVE.

No. 586,405. Patented July 13, 1897.

FIG. 1.



Witnesses:
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Wm. A. Blair

Inventors:
Samuel M. Vauclain
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by their Attorneys,
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(No Model.) 4 Sheets—Sheet 2.

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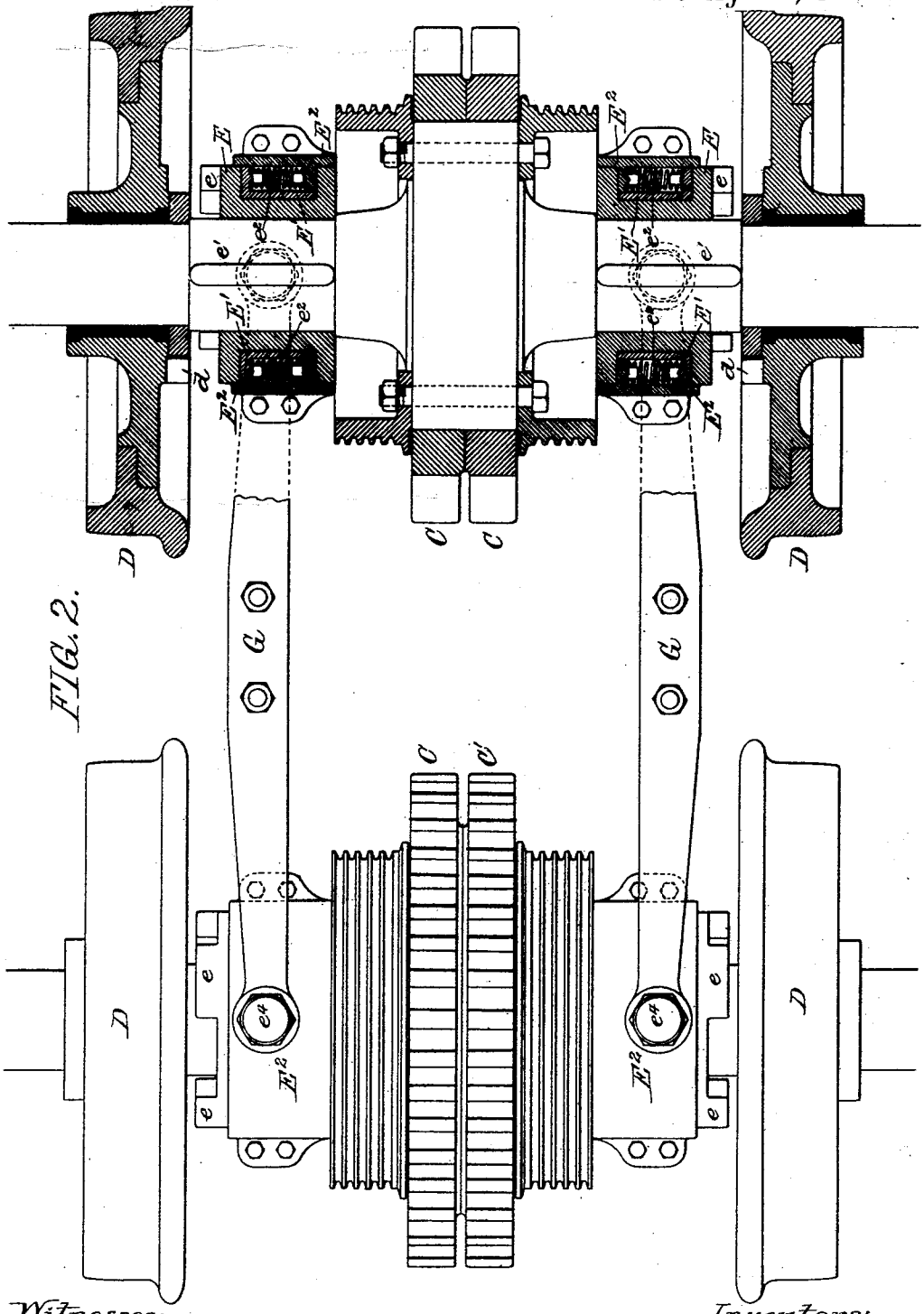

FIG. 2.

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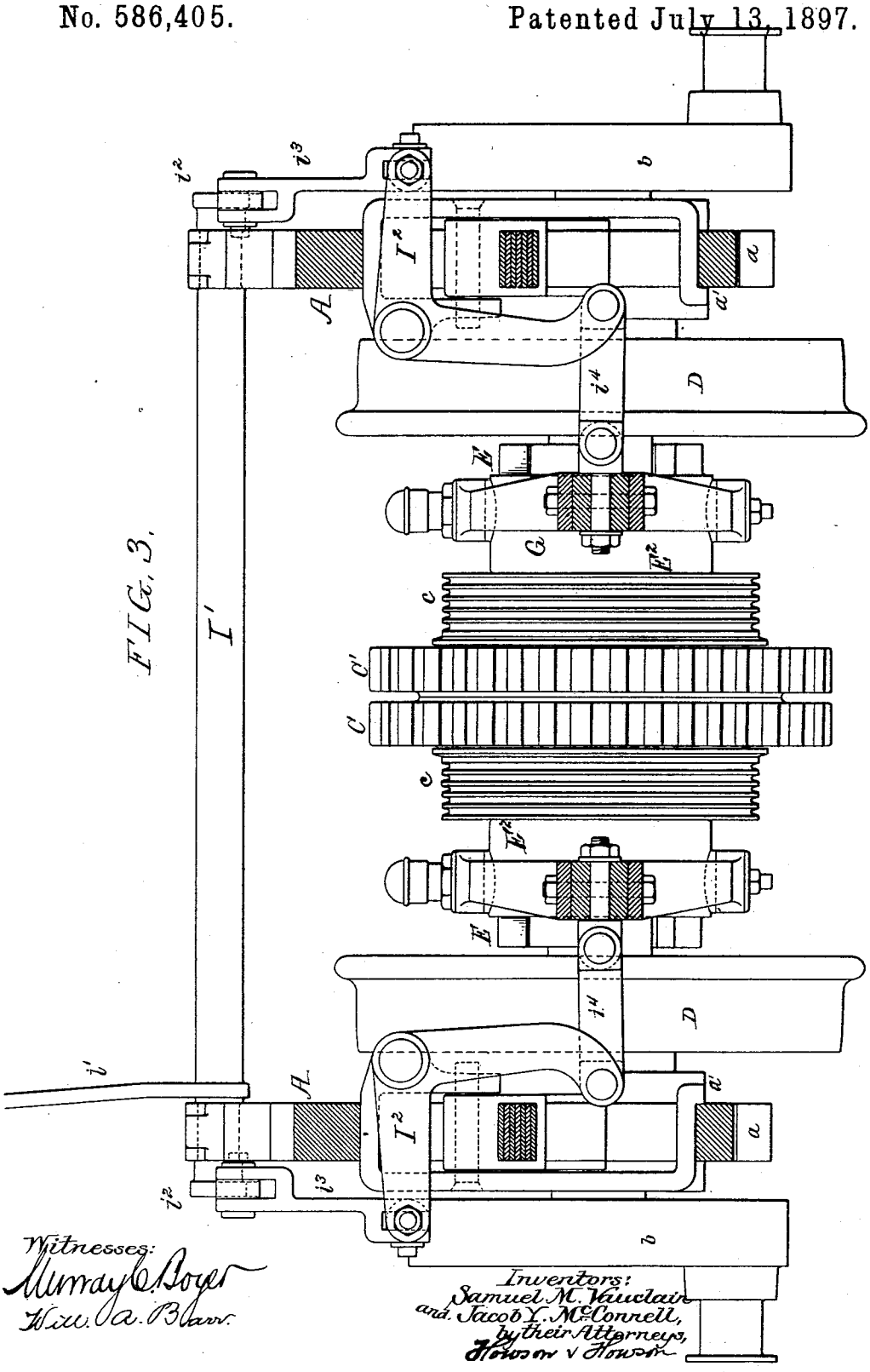
FIG. 3.



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(No Model.) 4 Sheets—Sheet 4.

S. M. VAUCLAIN & J. Y. McCONNELL.

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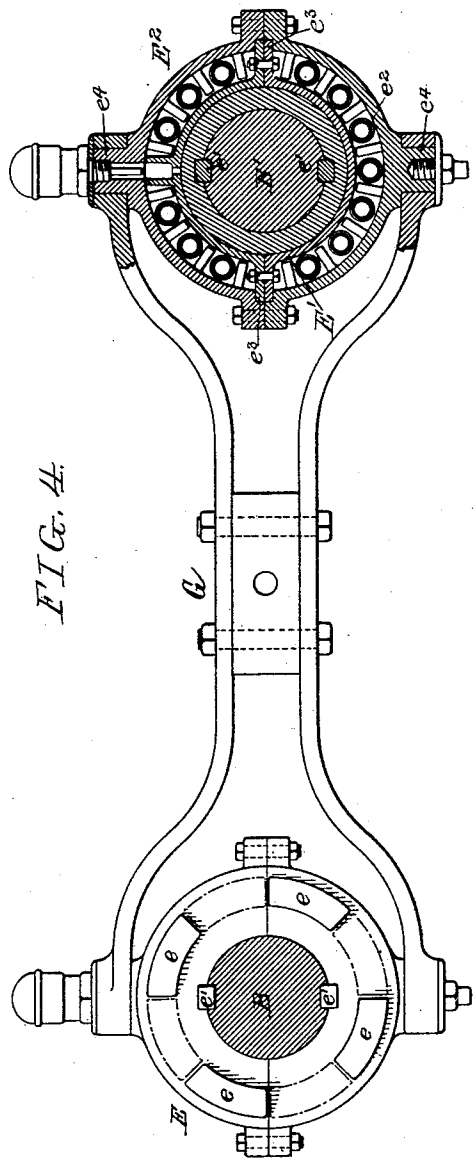

FIG. 4.

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UNITED STATES PATENT OFFICE.

SAMUEL M. VAUCLAIN, OF PHILADELPHIA, AND JACOB Y. McCONNELL, OF DARBY, PENNSYLVANIA.

COMBINED RACK AND ADHESION LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 586,405, dated July 13, 1897.

Application filed March 18, 1897. Serial No. 628,218. (No model.)

To all whom it may concern:

Be it known that we, SAMUEL M. VAUCLAIN, of Philadelphia, and JACOB Y. McCONNELL, of Darby, Pennsylvania, citizens of the United States, have invented certain Improvements in a Combined Rack and Adhesion Locomotive, of which the following is a specification.

The object of our invention is to so construct the mechanism of a locomotive that the driving-axles on which are mounted the rack-wheels can be thrown into and out of gear with the adhesion-wheels, so that it can be used either as an adhesion-locomotive or as a rack-locomotive.

Our invention consists in certain clutching mechanism on one or both axles, which is controlled by a lever in the cab of the locomotive, so that when the engine-driver passes from an inclined plane to a level track he can operate the mechanism and clutch the adhesion-wheels to the axle, as fully described hereinafter, reference being had to the accompanying drawings, in which—

Figure 1 is a side view of a locomotive in dotted lines, with the parts illustrating our invention in full lines. Fig. 2 is a plan view, drawn to a larger scale, on the line 2 2, Fig. 1, with a portion in section. Fig. 3 is a transverse sectional view on the line 3 3, Fig. 1. Fig. 4 is a sectional view on the line 4 4, Fig. 2.

A is the frame of a locomotive, having the usual pedestals *a* for the boxes *a'* of the axles B B'. These axles have the cranks *b b* at each side beyond the frames, as shown in Fig. 3, and secured to the central portion of each axle are the toothed wheels C C', which engage with the rack mounted between the rails of the roadway. These wheels are permanently secured to the axles and revolve with them at all times.

Secured to each side of the rack-wheels are the brake-drums *c*, which are used in this construction of rack-locomotives.

It will be understood that other forms of toothed wheels may be used without departing from our invention. In some instances a single wheel may replace the double wheels.

D are the supporting or adhesion wheels, being of the flanged type and loosely mounted on the axles B B'. These wheels travel on the ordinary type of rails, and when the rack-wheels are engaging the rack they simply act as supporting-wheels; but in order to utilize these wheels as driving-wheels when a locomotive is on a level or slight grade we provide mechanism for clutching the wheels to the axles, so that they then become the driving-wheels. We so arrange the clutch that it is a positive clutch, yet at the same time can be thrown during any portion of the movement and it will automatically lock at the proper point.

On the inner end of the hub of each wheel D are projections *d*, separated by suitable spaces, which form the fixed jaw of a clutch, while on each axle is the sliding section E of the clutch, having spaced projections *e*, which when moved into engagement with the wheel enter the spaces between the projection *d* on the hub of the wheel, thus locking the wheel to this sliding section E. This clutch-section E is splined to the axle by the keys *e'*, so that it will always turn with the axle. There is one of these sliding clutch-sections for each wheel, two being mounted on each axle, as clearly shown in Fig. 2.

In order that the engine-driver may operate this clutching mechanism during any portion of the stroke, we make the connection between the operating parts of the lever mechanism and the moving clutch-section E elastic, so that the said clutch-section will spring into place as soon as its projections are opposite the spaces between the projections of the wheel D. Each one of these connections is independent of the other, so that they all do not have to clutch simultaneously.

I is a lever pivoted in the cab of the locomotive and connected by a rod *i* to an arm *i'* of a rock-shaft I', which extends across the locomotive, and connected to each end of this rock-shaft is a short arm i^2, which is connected in turn by a rod i^3 to one arm of a bell-crank lever I^2, which is hung to the frame of the locomotive. The other arm of this lever is connected by a rod i^4 to the frame G, which extends from one axle to the other and is yoked at each end, as shown. There is one of these frames at each side of the locomotive.

Mounted on each clutch-section E is a cel-

lular ring E′, made in two halves bolted together within an annular channel of the section E, and mounted upon this ring is a second two-part ring E^2, having cells corresponding with the cells in the ring E′, and in each cell is a coiled spring e^2. These springs tend to press the rings apart. The rings are locked circumferentially by the projections e^3 of the inner-ring section entering cavities in the outer-ring section E^2. The bolting together of the two parts of the outer ring secures the inner ring in alinement with the outer ring, so that the only independent movement they have is the longitudinal movement.

On the outer-ring section E^2 are pivot projections e^4, to which are pivoted the arms of the yoke-frame G, so that on moving the lever in the cab to clutch the wheels to the axles the frames G will be moved bodily toward the wheels, compressing the springs between the rings E′ E^2 until the projections of the movable clutch-section are opposite the spaces in the adhesion-wheels, when the springs will force the clutch-sections quickly forward without a further movement of the frames G, and the wheels will be positively locked to the axles, and they can be driven in the same manner as an ordinary locomotive driving-wheel.

The details relating to the lever mechanism for operating the frames G may be arranged differently from that shown without departing from our invention. The design of the locomotive will be taken into consideration in making the connections.

The frames G are made of two plates bent at each end and secured to a filling-block at the center by bolts in the present instance, and in the ends of these plates are journaled the pivots e^4 of the ring-section E^2. The lever mechanism is coupled to the block mounted between the plates, as clearly shown in the drawings.

When the clutches are only mounted on one shaft, the frames G may be pivoted at one end to swing thereon when operated by the mechanism connected to the lever in the cab.

We claim as our invention—

1. The combination in a combined rack and adhesion locomotive, of a driving-axle, a rack-wheel secured thereto, adhesion-wheels loose thereon and having clutch-faces, a sliding clutch-section for each wheel mounted on the shaft, means for shifting the clutch-sections from the cab and means for throwing the clutches into engagement after shifting, substantially as described.

2. The combination in a combined rack and adhesion locomotive, of the driving-axles, a rack-wheel secured to each axle, the adhesion-wheels loose on each axle and having clutch-faces, a sliding clutch-section for each wheel, said sections being mounted on the axles, a frame extending from one axle to the other and coupled to two clutch-sections one on each axle, with means for operating the said frames, substantially as described.

3. The combination of the two axles B B′, the two adhesion-wheels loose on each axle, each adhesion-wheel having a clutch-face, sliding clutch sections mounted on each axle back of each wheel, two frames extending from one axle to the other and each coupled to a clutch-section on each axle, an operating-lever connected to the two frames so that on moving the said lever the frames with their movable clutch-sections will be moved toward their wheels, substantially as described.

4. The combination of an axle, a wheel loose thereon and having a clutch-face, a clutch-section adapted to turn with but slide longitudinally on the axle and also having a clutch-face adapted to engage with the clutch-face of the wheel, a ring on the said section, springs mounted between the ring and the section, means for moving the rings toward and from the wheel so as to move the clutch-section against the wheel and compress the spring that when the clutch-face of the section alines with the clutch-face of the wheel the springs will force them into engagement, substantially as described.

5. The combination of an axle, a wheel loose thereon having a clutch-face, a sliding clutch-section adapted to turn with but slide on the axle, a cellular ring E′ on the said section and a cellular ring E^2, springs within the cells of the two rings tending to force the rings apart laterally, operating mechanism connected to the ring E^2 so that the clutch will be thrown into engagement with the wheel through the rings and springs, substantially as described.

6. The combination of the axle, a wheel loose thereon and having a clutch-face, a sliding clutch-section E adapted to turn with but slide on the axle so as to engage with the wheel, an annular recess in the said section E, the two-part rings E′ and E^2 adapted to the annular recess, springs mounted between the rings and means for operating the clutch connected to the ring E^2, substantially as described.

7. The combination of the driven axle, a wheel loose thereon, having a clutch-face, a sliding clutch-section also having a clutch-face, said section adapted to turn with but slide on the axle, an annular groove in the periphery of the section, a two-part cellular ring E′ having a base and one side mounted within the groove, a two-part cellular ring E^2 mounted on the ring E′ and having an internal flange, with springs mounted between the said flange and the side of the ring E′ within the cells, with means for moving the ring E^2 toward and from the wheel so as to operate the clutch, substantially as described.

8. The combination of two axles B B′, the wheels loose thereon having clutch-faces and sliding clutch-sections on the axles, a ring on each clutch-section, springs between the

rings and the said sections, a frame consisting of two members, bent and secured together to form a double-forked frame, one end of the frame being coupled to one ring and the other end being coupled to the other ring, with means for moving the frame toward and from the wheels, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

SAMUEL M. VAUCLAIN.
JACOB Y. McCONNELL.

Witnesses:
GEO. H. SIMPKINS,
JUSTUS JOHNSON.