No. 609,289. Patented Aug. 16, 1898.

C. J. MOULTON & A. J. KEEBLE.

POTATO DIGGING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.) 4 Sheets—Sheet 1.

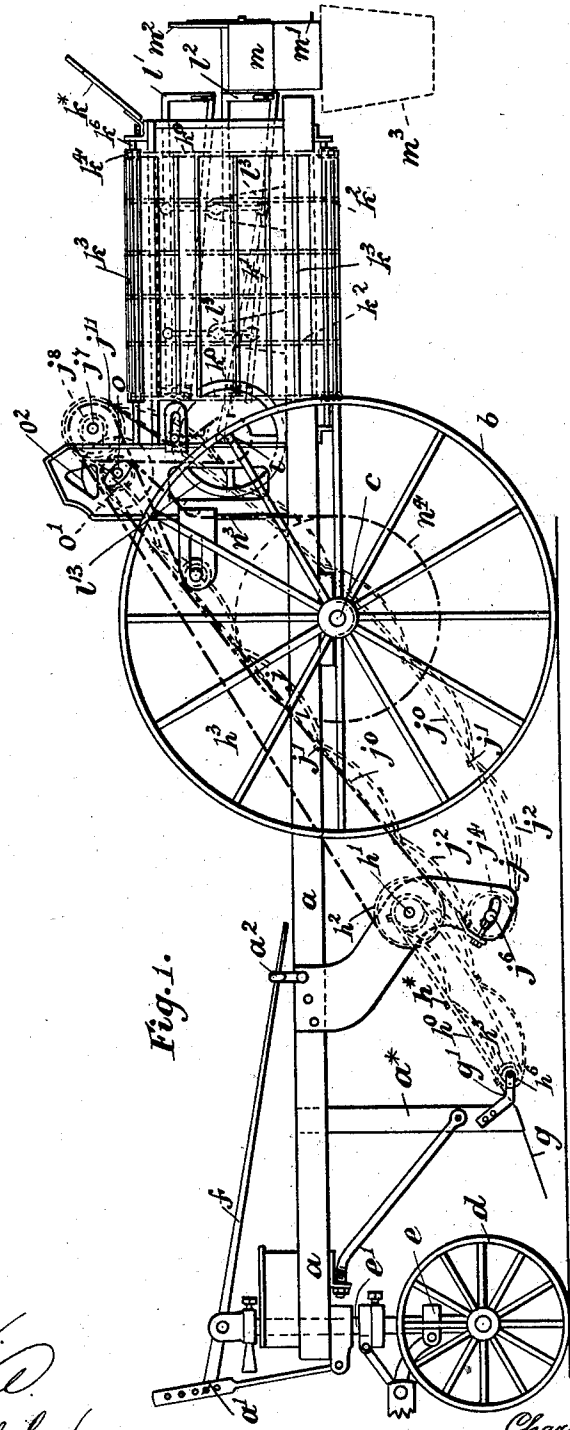


Fig. 1.

Witnesses.
E. L. Bancroft.
Nellie Callahan.

Inventors.
Charles Joseph Moulton.
Arthur James Keeble.
by Wm. N. Bancroft
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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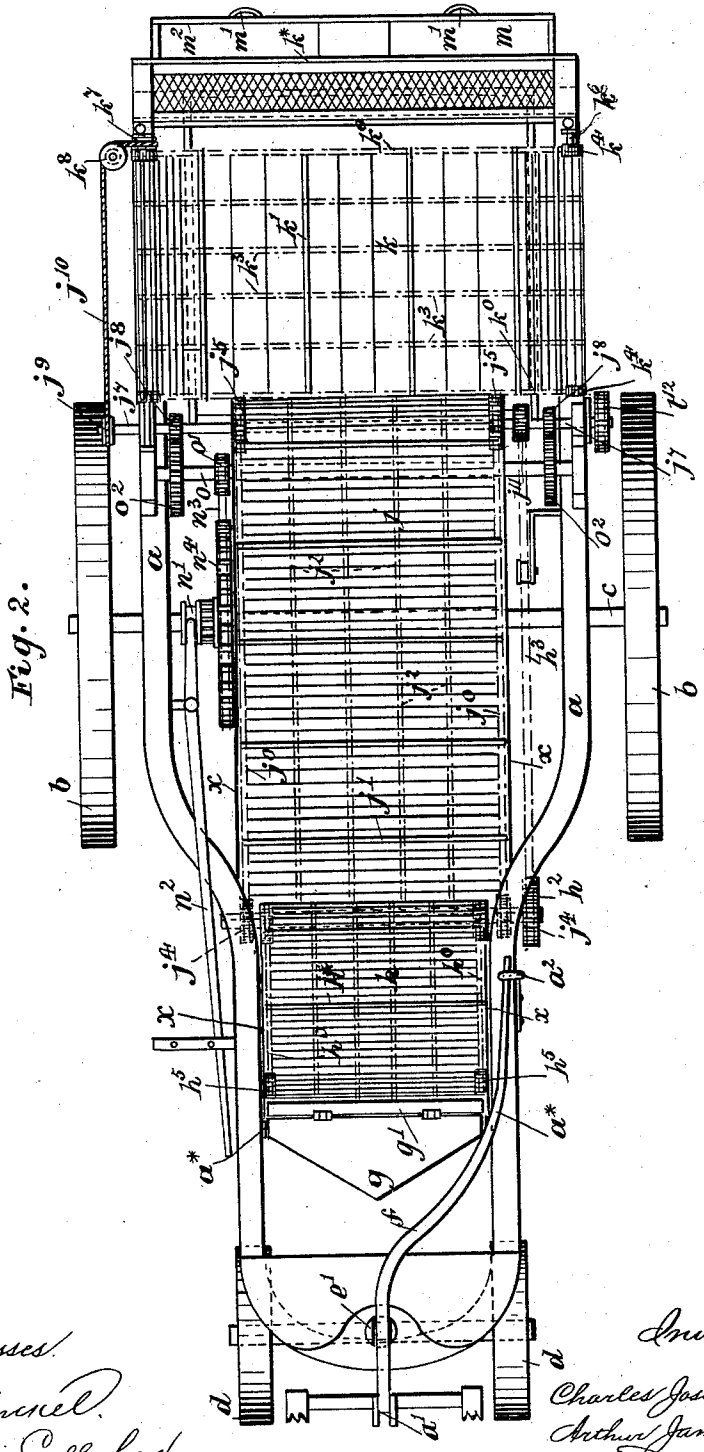
C. J. MOULTON & A. J. KEEBLE.

POTATO DIGGING MACHINE.

(Application filed Dec. 28, 1897.)

(No Model.) 4 Sheets—Sheet 2.

Fig. 2.



Witnesses:
E. A. Finckel.
Nellie Callahan

Inventors:
Charles Joseph Moulton.
Arthur James Keeble.
by Wm. T. Finckel
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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C. J. MOULTON & A. J. KEEBLE.

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(No Model.) (Application filed Dec. 28, 1897.)

4 Sheets—Sheet 3.

Fig. 3.

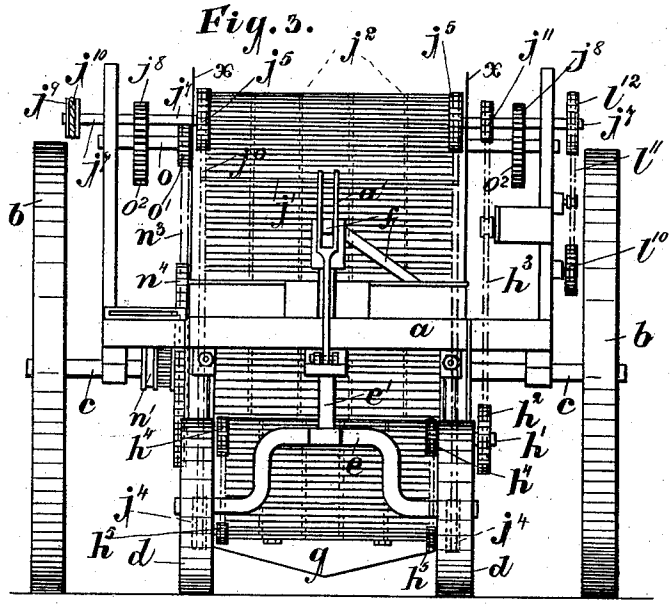
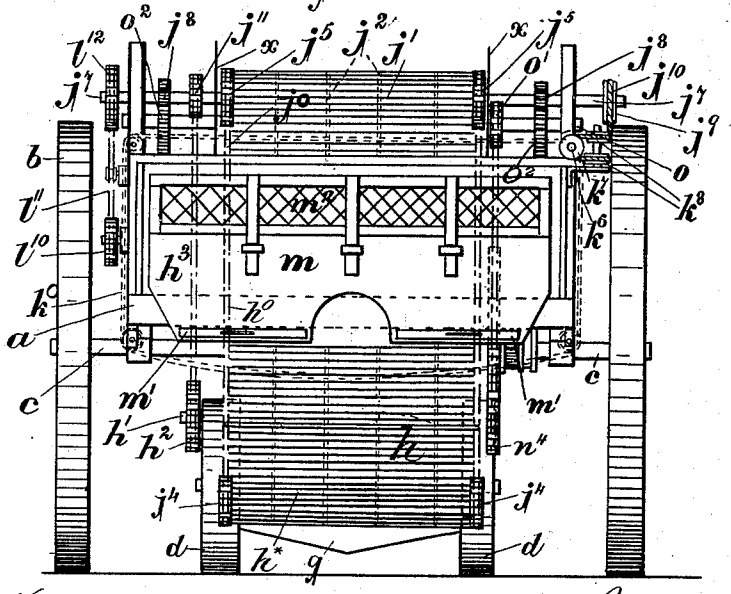


Fig. 4.



Witnesses:
E. A. Finnell.
Nellie Callahan.

Inventors:
Charles Joseph Moulton.
Arthur James Keeble.
by Wm. P. Finnell
their Atty.

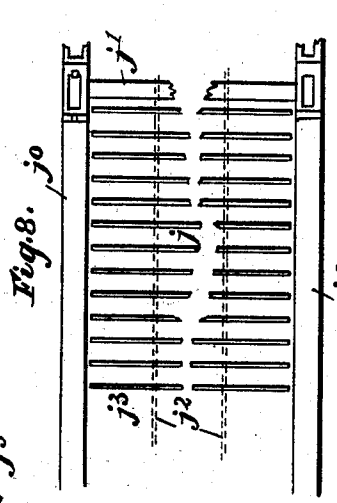
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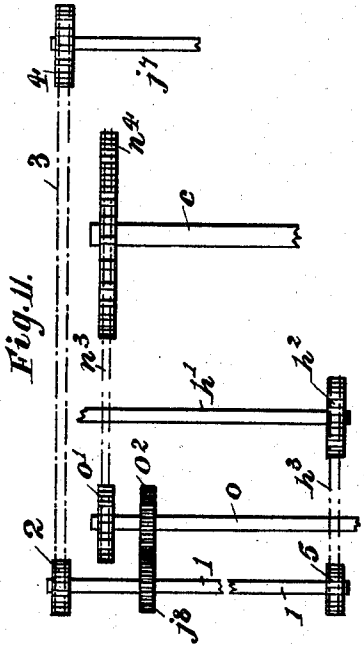
No. 609,289. Patented Aug. 16, 1898.

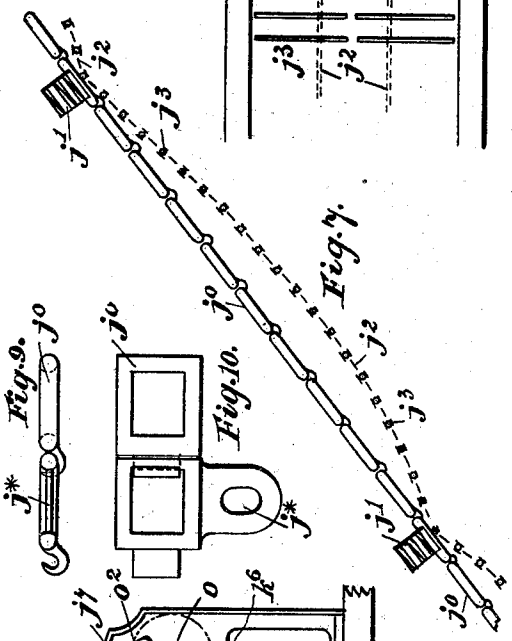
C. J. MOULTON & A. J. KEEBLE.

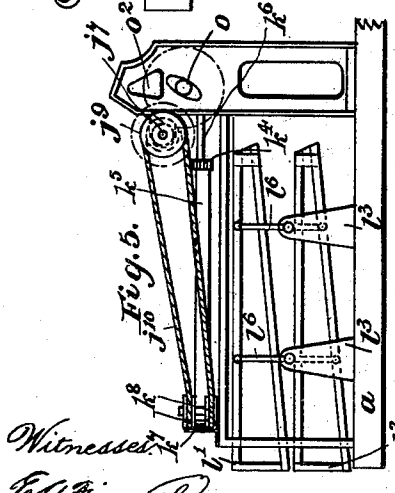
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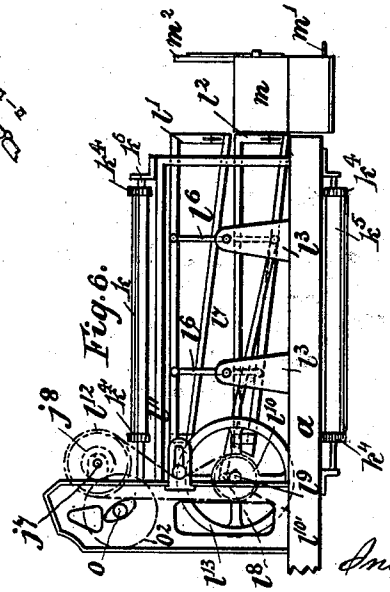
(No Model.) (Application filed Dec. 28, 1897.) 4 Sheets—Sheet 4.











Witnesses:
E. A. Finckel.
Nellie Callahan.

Inventors:
Charles Joseph Moulton.
Arthur James Keeble.
by W. N. Finckel
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

CHARLES JOSEPH MOULTON, OF CHATTERIS, AND ARTHUR J. KEEBLE, OF PETERBOROUGH, ENGLAND.

POTATO-DIGGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 609,289, dated August 16, 1898.

Application filed December 28, 1897. Serial No. 664,114. (No model.) Patented in England November 7, 1896, No. 25,003.

To all whom it may concern:

Be it known that we, CHARLES JOSEPH MOULTON, residing at Chatteris, in the county of Cambridge, and ARTHUR JAMES KEEBLE, residing at Peterborough, in the county of Northampton, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Potato-Digging Machines, (patented in England November 7, 1896, No. 25,003,) of which the following is a full, clear, and exact description.

The invention relates to improvements in potato-digging machines, whereby we greatly improve the operation thereof.

Our invention is illustrated in the accompanying drawings, in which—

Figure 1 is a side view, Fig. 2 a plan, Fig. 3 a front view, and Fig. 4 a rear view, of a potato-digger provided with our present improvements. Fig. 5 is an elevation seen from the right-hand side of the machine of parts carrying and giving motion to the topping-screen and showing the shaking-riddles and their supports. Fig. 6 is a side elevation of parts carrying and giving motion to the shaking-riddles, the topping-screen being shown in section. Fig. 7 is a sectional elevation, and Fig. 8 is a plan, of part of the endless elevating-screen *j*. Fig. 9 is an edge view, and Fig. 10 a plan, of two links of said elevating-screen drawn to a larger scale. Fig. 11 shows a modified arrangement of driving-gear.

In carrying our invention into effect we employ a framing *a*, supported by a pair of wheels *b*, fixed to a rotating shaft *c*, and by a pair of smaller wheels *d*, mounted on a fore carriage *e*, supporting the front of the frame *a*, which latter is capable of being raised and lowered in relation to the fore carriage *e* by means of a lever *f*. For this purpose the lever *f* is pin-jointed to the upright *e'* and is adjustably connected at one end to the link *a'*, while its other end is held by a hook a^2.

g is a share fixed to dependent arms a^*, attached to the frame *a* and acting to lift each row of potatoes and the earth in which they have grown to the lower end of a short endless elevator *h*, the working face of which is on a line or thereabout with the face of the share, while the upper end is above and projects somewhat over the lower end of an endless elevating-screen *j*. This lower elevator *h* is narrower and is or may be worked at a slower speed than the upper elevator *j*, and in order to prevent injury to the machine by stones we hinge a portion *g'* of the rear end of the share, so that when a stone is lifted by the lower elevator *h* such hinged portion *g'* of the share shall give way and allow the stone to pass without injury to the machine. By these arrangements the earth will become disintegrated and separated from the potatoes, partly by falling over the upper end of the lower elevator *h* onto the lower end of the upper elevator *j* and partly by the vibration of this latter elevator and its increased speed as compared with the lower elevator *h* when such increased speed is used.

The endless elevating-screen *j* is formed of two main outer chains j^0, connected together at suitable intervals by cross-bars *j'*, attached to lugs j^*, formed on certain of the links of the chains j^0, and a series of slacker chains j^2, which, being connected to the cross-bars *j'*, so as to fall below the main chains j^0, and by the aid of cross-rods j^3, passed through links of the chains j^2, form pockets to receive and securely carry the potatoes up to the top of the elevating-screen *j*. The pockets thus formed also, by their having a considerable amount of vibratory motion both in traveling forward and in passing over their supporting-wheels, assist in separating the earth from the potatoes and in clearing earth from themselves.

The elevating-screen *h* is constructed in similar manner to the elevating-screen *j*. At each side of the endless elevating-screens *hj*, respectively, is arranged a guard *x*, of sheet iron or other suitable material, which is attached to and carried by the frame of the machine and is of such width as to prevent the potatoes on the said elevators from falling sidewise out of the pockets thereof.

When the potatoes, with their tops and with the weeds which have grown with them, have passed over the top of the elevating-screen *j*, they fall onto an endless transversely-traveling topping-screen *k*, the spaces of which are sufficiently large to allow all the potatoes

to pass therethrough, but which will hold back and separate the tops and weeds therefrom and carry the latter away to the side of the machine, where they will fall to the ground. A guard k^* is fitted at the outer or rear side of the topping-screen k to prevent any tops or unriddled potatoes from falling into the receiver m.

The potatoes after having passed through the endless topping-screen fall onto a pair of superposed shaking riddles or screens l' l^2, each consisting of two vertical sides, a closed front, an inclined screening-bottom, and an open rear end for delivery of the screened potatoes. The upper screen l' has a more open screening-bottom than that of the lower screen l^2. The larger potatoes are retained by the upper screen l', while the smaller potatoes and accompanying earth fall onto the lower screen l^2, where the potatoes are separated from the earth, which latter falls through to the ground, while the potatoes from both screens fall into a box or receiver m, whence they may be allowed to fall into baskets carried beneath such receiver.

The receiver m is provided with a rear guard m^2 and with movable bottoms or sliding doors m', which can be closed when the baskets m^3 are to be removed and reopened when the latter are replaced.

Motion is given to the endless elevating-screens, topping-screen, and shaking riddles or screens in the following manner: On the main wheel-shaft c is fitted a chain-wheel n^4, which is capable of being put into or out of gear with the shaft c by means of a clutch n', operated by means of a lever n^2. Motion is communicated from the chain-wheel n^4 by means of a chain n^3 to a chain-wheel o', fixed on a cross-shaft o, on which are also mounted spur-pinions o^2, which gear with spur-pinions j^8, mounted on the cross-shaft j^7, near each end thereof. The main chains j^0 of the upper endless elevating-screen are mounted on chain-wheels j^5, fitted on the cross-shaft j^7 at top, and on chain-wheels j^4 on the cross-shaft j^6 at bottom. On one end of the cross-shaft j^7 is mounted a chain-wheel j^{11}, which by means of a chain h^3 rotates a chain-wheel h^2, fitted on a cross-shaft h', on which are mounted the chain-wheels h^4, which operate the main chains h^0 of the lower endless elevating-screen. The bottom end of the lower endless elevating-screen is supported by chain-wheels h^5 and rollers fitted on a cross-shaft h^6, carried by brackets fixed to the arms a^*. The elevating-screen h is also provided with the cross-bars h^*.

The topping-screen k is formed of two endless main chains k^0, connected at intervals by cross-bars k' and by other chains k^2, fixed to such cross-bars and having cross-rods k^3 passed at suitable distances through the links thereof. This endless topping-screen k runs over driving chain-wheels k^4 and guide-rollers k^5. The driving chain-wheels k^4 are fixed on a shaft k^6, on which is fixed a grooved pulley k^7, over which and over guide-pulleys k^8 (seen more clearly at Fig. 5) runs a driving band or chain j^{10}, receiving motion from a driving-pulley j^9 on the shaft j^7.

The pair of superposed shaking-riddles l l^2 (see Fig. 6) are mounted in brackets l^3, carried on the framing a. Rocking levers l^6 are pinned at their ends to the top and bottom riddles, respectively, the rocking motion being communicated to each by a rod l^7, fixed to the bottom end of one of the rocking levers, the other end being fixed to a crank-pin or eccentric l^8 on the shaft l^9, on which latter is fixed a chain-wheel l^{10}, driven by a chain l^{11} from the chain-wheel l^{12}, fixed on the cross-shaft j^7. A fly-wheel l^{13} may be fitted to the crank-shaft l^9.

In the modified arrangement of driving-gear shown at Fig. 11 a large chain-wheel n^4, fitted on the main wheel-shaft c, communicates motion by means of a chain n^3 to a chain-wheel o', fitted on a cross-shaft o, which shaft may be mounted on any convenient part of the framing a. On the cross-shaft o is fitted a spur-pinion o^2, which gears with a spur-pinion j^8, fitted on a cross-shaft 1, placed with this arrangement alongside the cross-shaft o. On one end of the shaft 1 is fitted a chain-wheel 2, which communicates motion by means of a chain 3 to a chain-wheel 4 on a shaft j^7, on which the wheels actuating the top of the upper endless elevator j are mounted. On the other end of the cross-shaft 1 is a chain-wheel 5, which communicates motion by means of a chain h^3 to a chain-wheel h^2, fitted on a cross-shaft h', on which the chain-wheels actuating the upper end of the lower endless elevator h are mounted. The advantage of this modified arrangement of gearing is that by increasing or decreasing the size of the chain-wheels 2, o', and 4 and 5 and h^2, the normal and relative speeds of the upper and lower endless elevators can be increased or decreased, as desired.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a potato-digging machine, the combination with a suitable frame, of a potato-digging share, a hinged part at the rear of such share, a short endless elevating-screen formed with a number of pockets and having its working face on a level or thereabout with the face of the share, a longer endless elevating-screen formed with a number of pockets and having its lower end below the upper end of the short endless elevating-screen, an endless cross-traveling topping-screen receiving the potatoes, tops, weeds and earth, from the longer endless elevating-screen, a pair of shaking screens or riddles receiving the potatoes from the topping-screen and delivering the potatoes to receivers, substantially as herein set forth.

2. In a potato-digging machine, the endless elevating-screens consisting of the combination of main outer chains, cross-bars connecting such outer chains together at intervals,

lugs on certain links of the outer chains to which such cross-bars are fixed, slacker intermediate chains connected to the cross-bars and falling below the main chains, and cross-rods passed through links of the slacker chains to form pockets to receive and carry the potatoes, substantially as herein set forth.

3. In a potato-digging machine, the topping-screen consisting of the combination of outer and intermediate chains, cross-bars connecting the outer chains, and cross-rods passed through the intermediate chains, substantially as herein set forth.

4. In a potato-digging machine, the combination of a potato-digging share, a short endless elevating-screen, a longer endless elevating-screen, guards at each side of said screens, an endless transversely-traveling topping-screen, a pair of shaking-riddles around which the topping-screen travels, and a potato-receiver provided with sliding doors or bottom, substantially as herein set forth.

5. In a potato-digging machine, the combination with a suitable frame, of a potato-digging share, a hinged part at the rear of such share, a short endless elevating-screen formed with a number of pockets and having its working face on a level or thereabout with the face of the share, a longer endless elevating-screen formed with a number of pockets and having its lower end below the upper end of the short endless elevating-screen, means to impart to said longer endless elevating-screen a greater speed than the shorter, an endless cross-traveling topping-screen receiving the potatoes, tops, weeds and earth from the longer endless elevating-screen, and a pair of shaking screens or riddles receiving the potatoes from the topping-screen and delivering them to receivers, substantially as herein set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES JOSEPH MOULTON.
A. J. KEEBLE.

Witnesses:
B. J. B. MILLS,
CLAUDE K. MILLS.