N° 24,868 A.D. 1902

Date of Application, 12th Nov., 1902—Accepted, 12th Jan., 1904

COMPLETE SPECIFICATION.

"Improvements in Adding Machines."

I, ARTHUR JAMES POSTANS, of 155 Fulham Road, South Kensington, in the County of London, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to an adding machine in which the depression of keys having on them the index numbers, moves a series of drums in such a way that the number formed by the juxtaposition of numerals on their peripheries and appearing through an opening in the casing, is increased to the extent of the number appearing on the key that has been depressed.

The accompanying drawings shew a machine constructed according to this invention, in which Fig. 1 is a plan, Fig. 2 a side elevation, Fig. 3 a plan with the cover removed Fig. 4 a section on the line 4—4 of Fig. 3, and Fig. 5 a detail view, Figs. 3, 4 and 5 being drawn to an enlarged scale.

a is a base plate having two sides *b* and a back b^1 and two series of pedestals *c* c^1 arranged towards the front. On the axle *d* supported by the sides *b* is arranged a series of drums of which three are shewn, although there may be a larger number, having numbers printed on their peripheries in consecutive order, the right hand drum 1 representing units in the completed number, the second drum 2 tens, the third drum 3 hundreds, and so on. When the cover *e* is placed over the apparatus, only the one figure of each drum can be seen through the opening *f*. The unit drum is operated by a toothed quadrant *g* engaging with a toothed pinion *h* mounted to revolve freely on the axle *d*, and to this pinion is attached a lever *i* carrying a spring pawl *j* engaging a ratchet wheel *k* fixed to the unit drum 1. This rocking lever also carries a projection *l* which butts against the hollowed end of a spring detent *m* pressing it into the teeth of a toothed pinion k^1, so as to stop the motion of the mechanism and consequently of the unit drum as soon as the projection *l* comes against the detent *m*.

The drum is prevented from turning in the backward direction by a spring detent 16 engaging the teeth of the pinion k^1. The toothed quadrant *g* constitutes one arm of a three-armed lever which is mounted on a shaft *o* supported in the sides *b*; the second arm *n* of the lever has a cross arm extending above and below at an angle from it in the form of a T to the extreme ends of which are connected two stepped bars *p* which are connected at their other ends to a similar T-ended lever n^1 mounted at the other end of the shaft *o*. The toothed quadrant *g*, its levers *n* n^1 and bars *p* are brought back into their normal position by a spring *v* attached to the third arm n^2 of the lever and to the back b^1 of the apparatus.

The bars *p*, which are stepped as shewn, rest on a series of levers *s* hooked at their inner ends and mounted on spindles *r* supported in the pedestals *c* c^1, the outer ends of each of which levers are formed as finger keys *t* having index numbers marked thereon, and arranged in two rows one above the other as shewn. The hooked ends of the levers *s* are made of varying lengths, propor-

[*Price 8d.*]

tionate to the index numbers marked on the keys, and by their action on the stepped bars *p* they cause the toothed quadrant *g* to travel through a smaller or greater arc according as to whether the key marked with a "1" or a key marked with a higher number is depressed. These levers are brought to their normal position by springs *w* w^1 connected to eyes *x* x^1 formed in the levers and attached to bars 13 and 14 fixed to the sides *b* and extending across the machine. By arranging the levers *s* in two rows and the bars *p* in stepped form and making the lower row of levers, which have to give the longer travel to the quadrant *g*, engage the bars *p* at a greater distance from the axis than the upper levers, the amount of travel of the finger keys necessary to give the desired impulse to the indicating drums is compensated, thus rendering the stroke of all the finger keys equal.

The carrying over from one drum to the next can be effected in any known manner, but as shewn in Fig. 5, the drums 1 and 2 are each provided with a snail cam 8 on the edge of which bears a pin 9 projecting from a lever 10 mounted on the bar 11 and carrying at its extreme end a pawl 15 engaging with the teeth of a ratchet wheel 12 one of which is fixed to each of the drums 2 and 3. As the cam 8 revolves, it gradually raises the lever 10 and consequently its pawl 15 in opposition to a spring 15^a until the pawl engages the next tooth of the wheel 12 when the pin 9 having arrived at the highest point of the cam 8 suddenly drops in obedience to the strain of the spring 15^a, causing the drum to move one division, its further movement being prevented by a stop 10^a carried by the lever 10, bearing against a tooth of the wheel 12. The operation of the machine is as follows:—

The finger key marked with the number which is to be added, being depressed, causes the hooked end of the lever *s* to rise and this acting on one of the bars *p* and the rocking levers *n* n^1, causes the quadrant *g* to travel through an arc the length of which is dependent on the number depressed. This movement of the quadrant *g* turns the pinion *h* and with it the lever *i* and its pawl *j* which travels over a number of teeth of the ratchet wheel *k* corresponding with the number on the finger key which has been depressed. On releasing the finger key the spring *v* acting on the three-armed lever causes the quadrant *g* to return to its normal position, thereby moving the pinion *h*, its lever *i* and pawl *j* in the reverse direction. In doing this, the pawl *j* turns the pinion *k*, causing the unit drum 1 to travel round the number of spaces represented by the number on the key depressed, the other drums being caused to revolve in their turn by the carrying-over gearing.

The extent of movement of the quadrant *g* is determined and its overrunning prevented by the hooks at the inner ends of the levers *s* which lock the quadrant at the end of its stroke. The movement of the unit drum is also determined and its overrunning prevented, by the projection *l* butting against the detent *m* at the end of its stroke and pressing *m* into one of the teeth of the pinion k^1, thus preventing the drum registering more than the number represented by the key depressed.

In order to return the indicating drums to their zero position to enable a fresh addition to be made the axle *d* has fixed on one end a hand wheel 5 and on the other end is mounted a spring 6 to keep this hand wheel in its locked position, which is done by a stud 17 entering a hole in the side *b*. The wheel 5 is also locked by a catch 7 formed at the end of a spring lever 20 fixed to a collar 21 attached to the shaft *o* on which the rocking quadrant *g* is free to move and on which there is a rocking lever *q* which raises the bars *p* slightly.

By pressing the axle *d* against the pressure of spring 6, the stud 17 is released from its hole. If now the catch 7 be pressed outwards the wheel 5 can be turned and at the same time the quadrant *g* is rocked slightly by the movement of the lever *q*, disengaging the pawl *m* and allowing the unit drum to be moved. In that radius of each indicating drum which terminates with zero, is a pin 18 projecting from the drum or its snail, parallel with the axle *d*. This axle

carries three corresponding pins 19 projecting through longitudinal slots in collars surrounding the axle *d*. When the shaft is pressed to release the handle wheel 5, the pins 19 come into line with the pins 18 and when the axle *d* is rotated, they engage with each other and thus cause the indicating drums to revolve until all the drums are brought into the zero line when the stud 17 coming opposite its hole in the side *b* is drawn in by the pressure of the spring 6; at the same time the catch 7 again takes into its slot in the hand wheel and the unit drum is once more locked, all the drums shewing zero in the opening of the casing.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an adding machine in which drums are rotated by the depression of levers, a bar which is raised by any of the levers and transfers the movement of the latter to the mechanism which drives the drums, each of the levers being of a length suitable to the extent to which it is required to raise the bar and having on its end a hook which engages with the bar and terminates the stroke of the lever while preventing overrunning of the driving mechanism, substantially as described.

2. Making the bar which is to be raised by the levers in steps each step engaging with the hooked end of a lever of varying length at the end of its stroke, the arrangement being such that all the levers have the same stroke, substantially as described.

3. The arrangement whereby the bar which is raised by the levers is returned by spring action and is brought to rest by a stop, substantially as described.

4. The device for returning the drums to zero, comprising a spring urged shaft on which the drums are mounted, passing through collars, having fixed on its one end a hand wheel and at suitable distances apart on it pins which project through slots in collars in such manner that when the shaft is moved against the spring pressure to unlock the wheel from its normal engagement with the frame and is then rotated, each of the pins engages with other pins mounted on the drums and rotate the drums until the wheel is automatically returned by the spring pressure to its locked position, substantially as described.

5. In a device such as is referred to in Claim 4, a spring lever engaging in the wheel at the end of the spring urged shaft, the movement of which lever to unlock the wheel also unlocks the unit drum to enable it to be turned by the pin on the spring urged shaft, substantially as described.

6. An adding machine constructed and operating substantially as described.

Dated this 12th day of November, 1902.

ABEL & IMRAY,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1904.

A.D. 1902. Nov 12. N° 24,868.
POSTANS' COMPLETE SPECIFICATION.

(3 SHEETS)
SHEET 1.

Fig. 1.

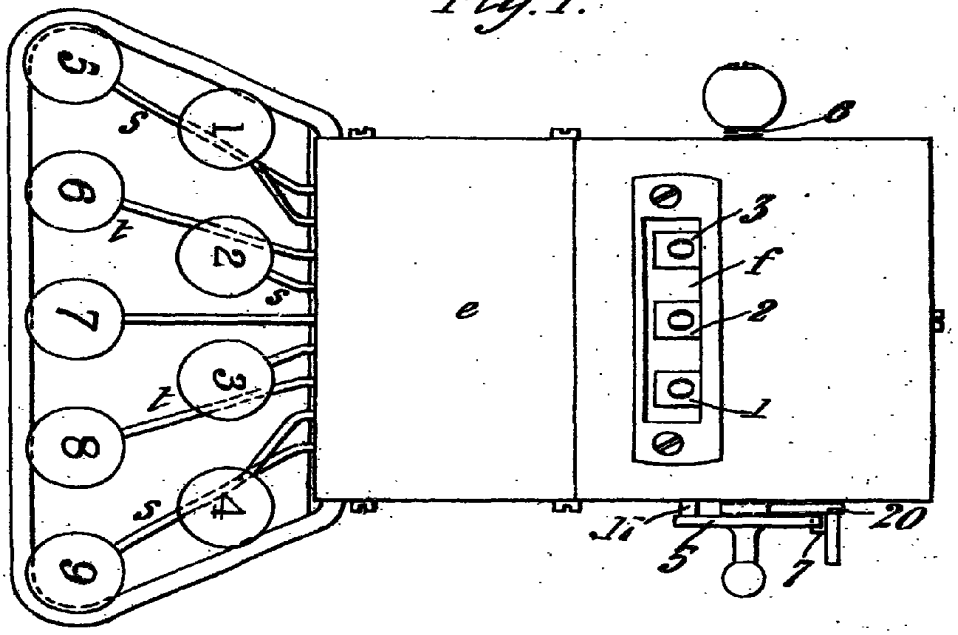
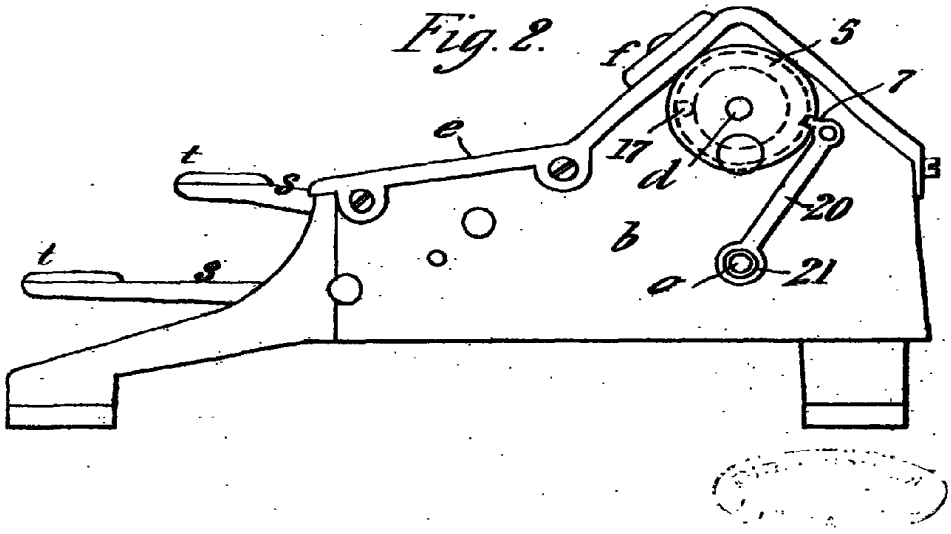


Fig. 2.



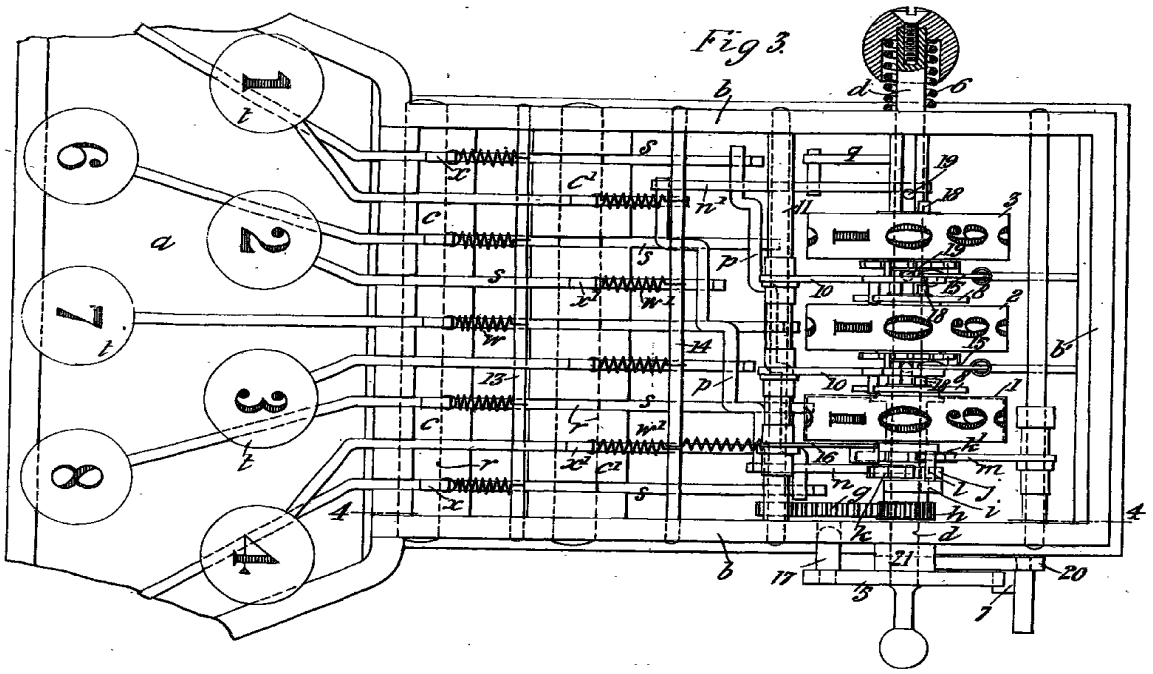
[This Drawing is a reproduction of the Original on a reduced scale.]

Malby & Sons, Photo-Litho.

A.D. 1902. Nov 12. N° 24,868.
POSTMANS' COMPLETE SPECIFICATION.

(3 SHEETS)
SHEET 2

Fig 3.



[This Drawing is a full-size reproduction of the Original.]

Maclay & Sons, Photo-Litho

A[illegible] 1902. Nov 12. N°. 24,868.

POST[illegible]NS' COMPLETE SPECIFICATION.

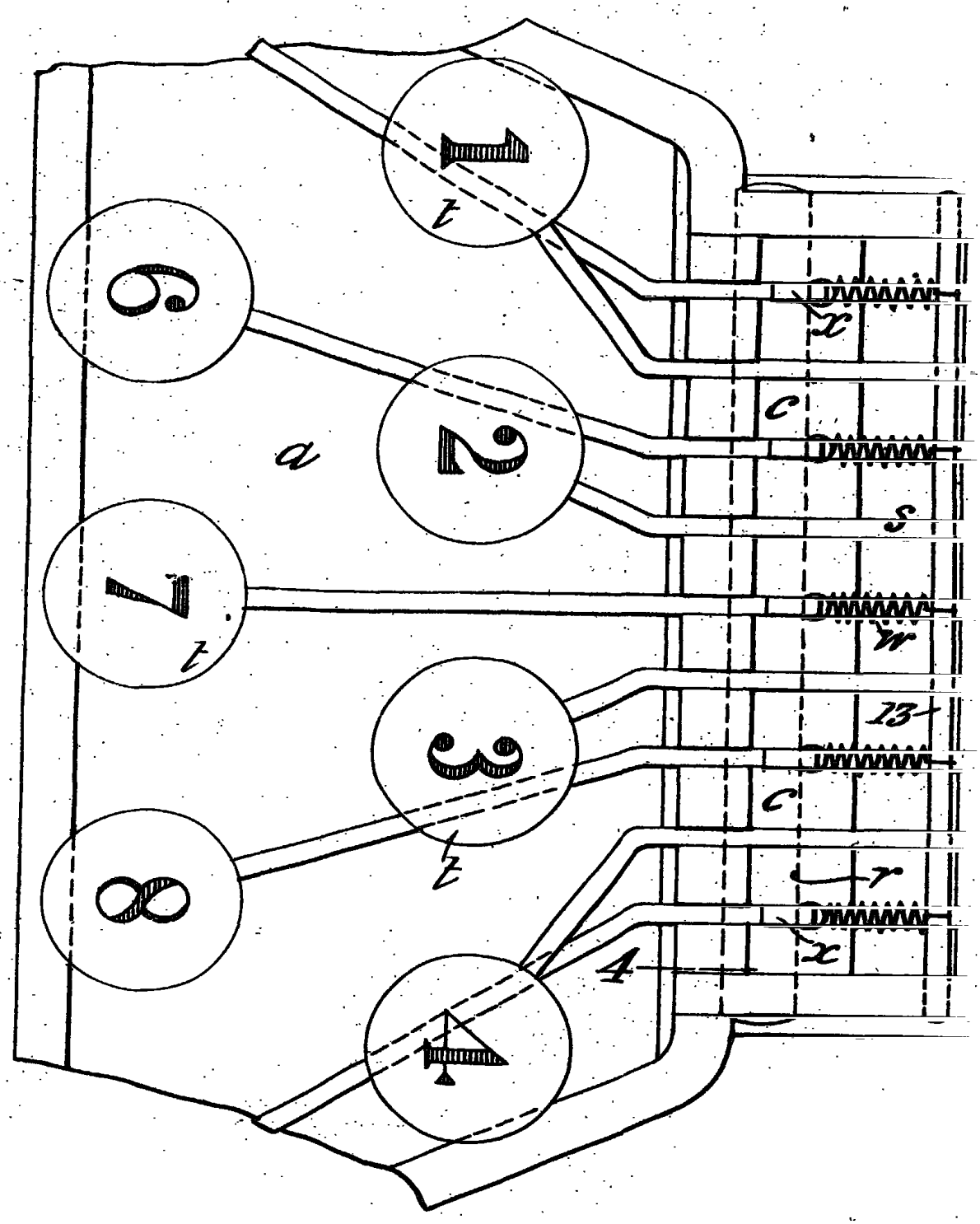
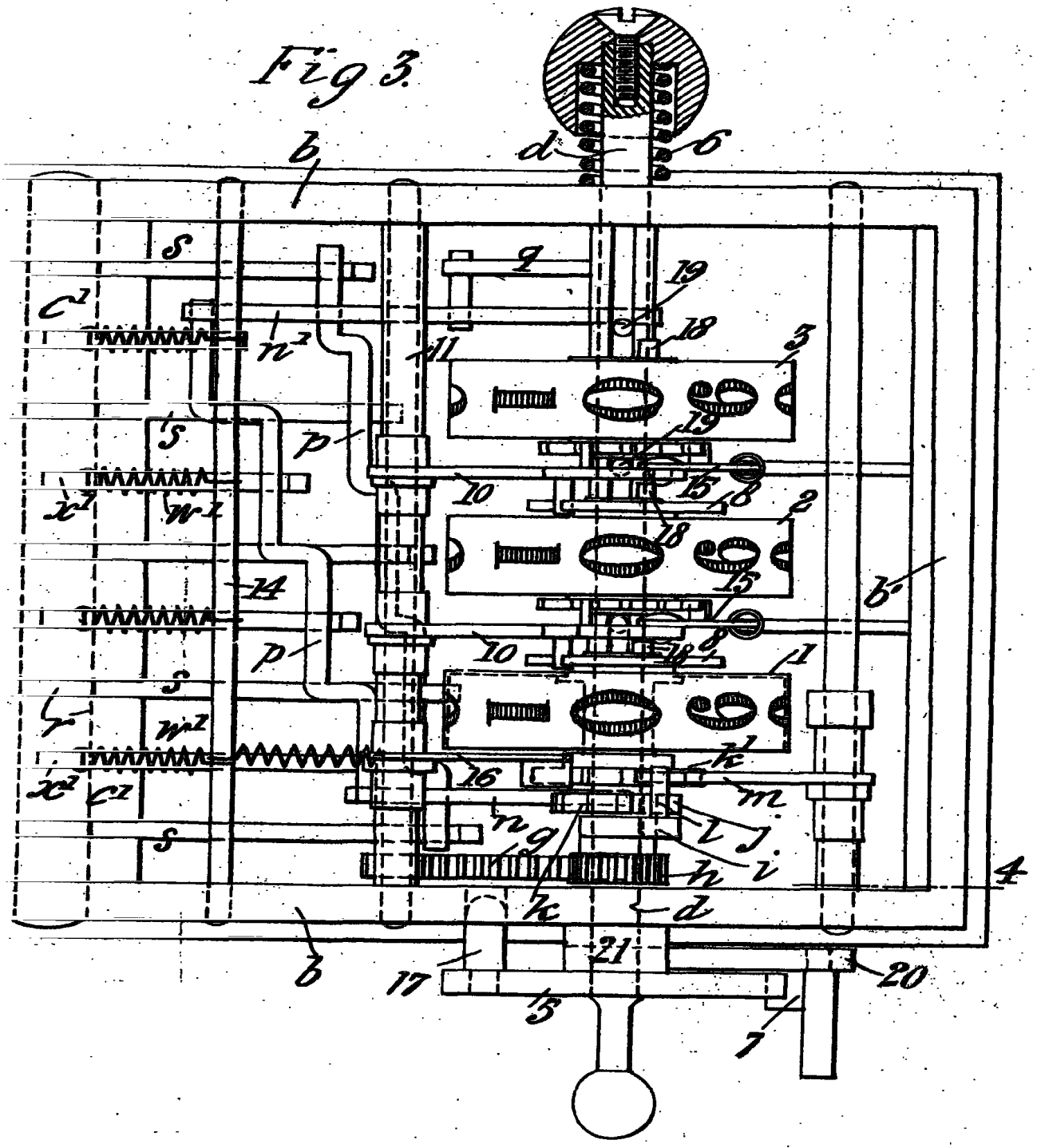


Fig 3.


b
d
6
S
C1
n1
9
19
18
3
11
S
P
19
10
15
18
2
18
14
15
b'
P
10
1
S
C1
m1
16
k1
m
n
g
l
j
i
h
4
S
k
d
21
20
b
17
5
7

A.D. 1902. Nov 12. N°. 24,868.
PETTANS' COMPLETE SPECIFICATION.

[3 SHEETS)
SHEET 3

Fig. 5.

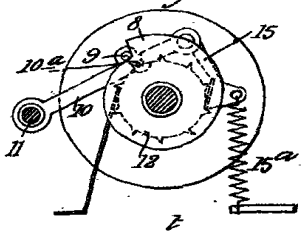


Fig. 4.

[This Drawing is a full-size reproduction of the Original.]

Walby & Sons Photo-Litho

A.D. 1902. Nov 12. N°. 24,868.

PATANS' COMPLETE SPECIFICATION.

Fig.5.

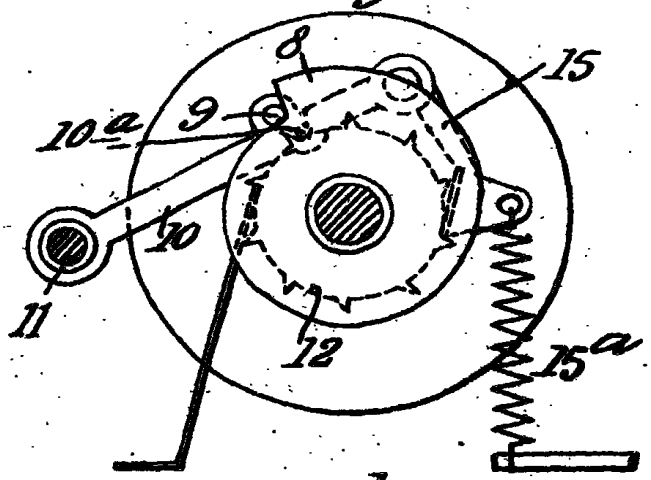


Fig.

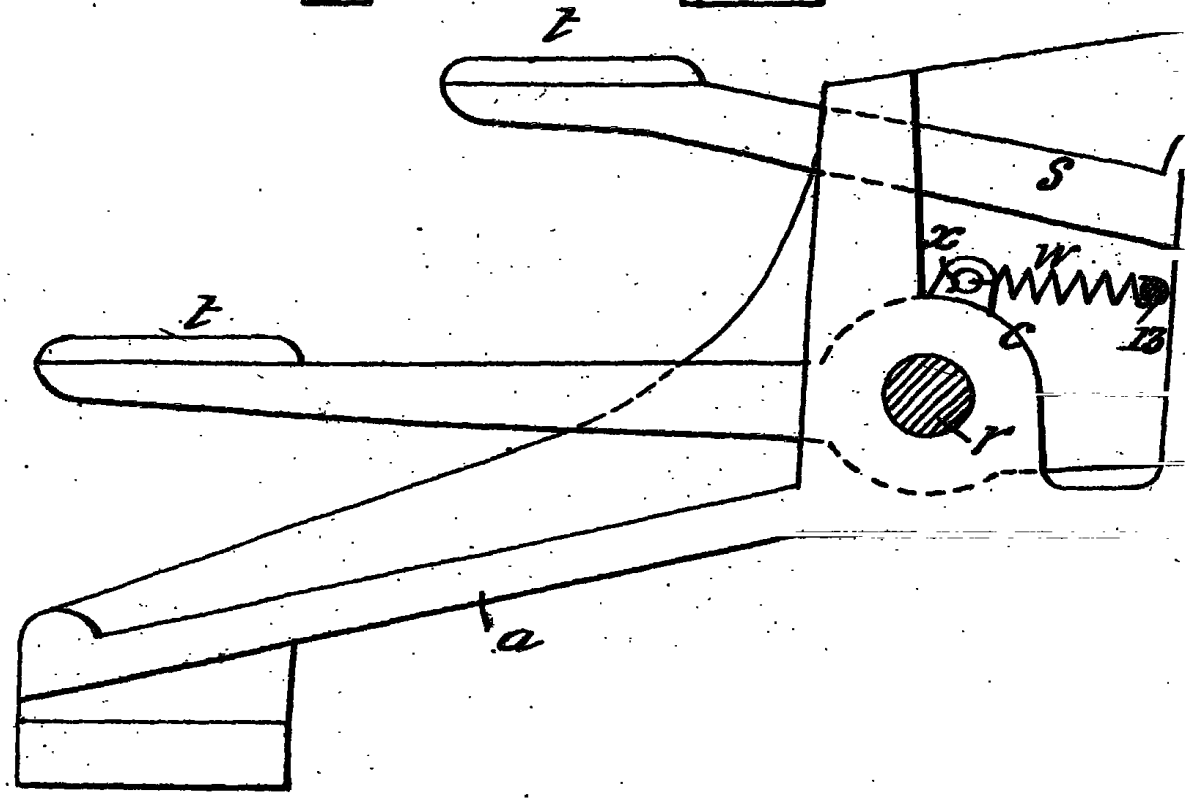
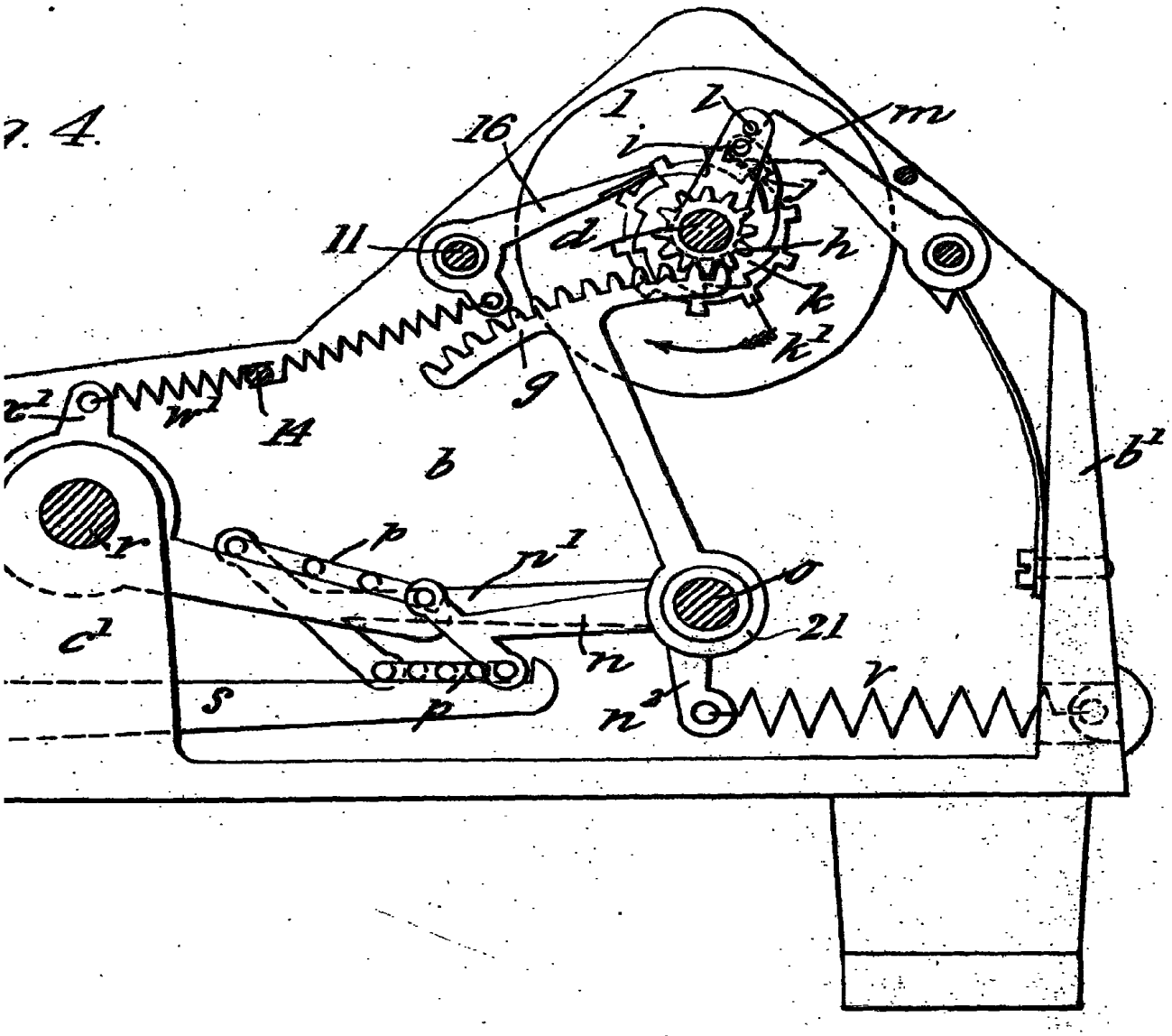


Fig. 4.



Malby & Sons, Photo-Litho.

AMENDED SPECIFICATION.

Reprinted as amended in accordance with the decision of the Chief Examiner dated the 12th day of February 1906.

(The Amendments are shown in erased and italic type.)

N° 24,868* **A.D. 1902**

Date of Application, 12th Nov., 1902—Accepted, 12th Jan., 1904

COMPLETE SPECIFICATION (AMENDED).

"Improvements in Adding Machines."

I, ARTHUR JAMES POSTANS, of 155 Fulham Road, South Kensington, in the County of London, Engineer, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement :—

This invention relates to an adding machine in which the depression of keys having on them the index numbers, moves a series of drums in such a way that the number formed by the juxtaposition of numerals on their peripheries and appearing through an opening in the casing, is increased to the extent of the number appearing on the key that has been depressed.

The accompanying drawings shew a machine constructed according to this invention, in which Fig. 1 is a plan, Fig. 2 a side elevation, Fig. 3 a plan with the cover removed Fig. 4 a section on the line 4—4 of Fig. 3, and Fig. 5 a detail view, Figs. 3, 4 and 5 being drawn to an enlarged scale.

a is a base plate having two sides *b* and a back b^1 and two series of pedestals *c* c^1 arranged towards the front. On the axle *d* supported by the sides *b* is arranged a series of drums of which three are shewn, although there may be a larger number, having numbers printed on their peripheries in consecutive order, the right hand drum 1 representing units in the completed number, the second drum 2 tens, the third drum 3 hundreds, and so on. When the cover *e* is placed over the apparatus, only the one figure of each drum can be seen through the opening *f*. The unit drum is operated by a toothed quadrant *g* engaging with a toothed pinion *h* mounted to revolve freely on the axle *d*, and to this pinion is attached a lever *i* carrying a spring pawl *j* engaging a ratchet wheel *k* fixed to the unit drum 1. This rocking lever also carries a projection *l* which butts against the hollowed end of a spring detent *m* pressing it into the teeth of a toothed pinion k^1, so as to stop the motion of the mechanism and consequently of the unit drum as soon as the projection *l* comes against the detent *m*.

The drum is prevented from turning in the backward direction by a spring detent 16 engaging the teeth of the pinion k^1. The toothed quadrant *g* constitutes one arm of a three-armed lever which is mounted on a shaft *o* supported in the sides *b*; the second arm *n* of the lever has a cross arm extending above and below at an angle from it in the form of a T to the extreme ends of which are connected two stepped bars *p* which are connected at their other ends to a similar T-ended lever n^1 mounted at the other end of the shaft *o*. The toothed quadrant *g*, its levers *n* n^1 and bars *p* are brought back into their normal position by a spring *v* attached to the third arm n^2 of the lever and to the back b^1 of the apparatus.

The bars *p*, which are stepped as shewn, rest on a series of levers *s* hooked at their

[*Price* 8*d*.]

inner ends and mounted on spindles *r* supported in the pedestals *c c*^{1}, the outer ends of each of which levers are formed as finger keys *t* having index numbers marked thereon, and arranged in two rows one above the other as shewn. The hooked ends of the levers *s* are made of varying lengths, proportionate to the index numbers marked on the keys, and by their action on the stepped bars *p* they cause the toothed quadrant *g* to travel through a smaller or greater arc according as to whether the key marked with a "1" or a key marked with a higher number is depressed. These levers are brought to their normal position by springs *w w*^{1} connected to eyes *x x*^{1} formed in the levers and attached to bars 13 and 14 fixed to the sides *b* and extending across the machine. By arranging the levers *s* in two rows and the bars *p* in stepped form and making the lower row of levers, which have to give the longer travel to the quadrant *g*, engage the bars *p* at a greater distance from the axis than the upper levers, the amount of travel of the finger keys necessary to give the desired impulse to the indicating drum is compensated, thus rendering the stroke of all the finger keys equal.

The carrying over from one drum to the next can be effected in any known manner, but as shewn in Fig. 5, the drums 1 and 2 are each provided with a snail cam 8 on the edge of which bears a pin 9 projecting from a lever 10 mounted on the bar 11 and carrying at its extreme end a pawl 15 engaging with the teeth of a ratchet wheel 12 one of which is fixed to each of the drums 2 and 3. As the cam 8 revolves, it gradually raises the lever 10 and consequently its pawl 15 in opposition to a spring 15^a until the pawl engages the next tooth of the wheel 12 when the pin 9 having arrived at the highest point of the cam 8 suddenly drops in obedience to the strain of the spring 15^a, causing the drum to move one division, its further movement being prevented by a stop 10^a carried by the lever 10, bearing against a tooth of the wheel 12. The operation of the machine is as follows :—

The finger key marked with the number which is to be added, being depressed, causes the hooked end of the lever *s* to rise and this acting on one of the bars *p* and the rocking levers *n n*^{1}, causes the quadrant *g* to travel through an arc the length of which is dependent on the number depressed. This movement of the quadrant *g* turns the pinion *h* and with it the lever *i* and its pawl *j* which travels over a number of teeth of the ratchet wheel *k* corresponding with the number on the finger key which has been depressed. On releasing the finger key the spring *v* acting on the three-armed lever causes the quadrant *g* to return to its normal position, thereby moving the pinion *h*, its lever *i* and pawl *j* in the reverse direction. In doing this, the pawl *j* turns the pinion *k*, causing the unit drum 1 to travel round the number of spaces represented by the number on the key depressed, the other drums being caused to revolve in their turn by the carrying-over gearing.

The extent of movement of the quadrant *g* is determined and its overrunning prevented by the hooks at the inner ends of the levers *s* which lock the quadrant at the end of its stroke. The movement of the unit drum is also determined and its overrunning prevented, by the projection *l* butting against the detent *m* at the end of its stroke and pressing *m* into one of the teeth of the pinion *k*^{1}, thus preventing the drum registering more than the number represented by the key depressed.

In order to return the indicating drums to their zero position to enable a fresh addition to be made the axle *d* has fixed on one end a hand wheel 5 and on the other end is mounted a spring 6 to keep this hand wheel in its locked position, which is done by a stud 17 entering a hole in the side *b*. The wheel 5 is also locked by a catch 7 formed at the end of a spring lever 20 fixed to a collar 21 attached to the shaft *o* on which the rocking quadrant *g* is free to move and on which there is a rocking lever *q* which raises the bars *p* slightly.

By pressing the axle *d* against the pressure of spring 6, the stud 17 is released from its hole. If now the catch 7 be pressed outwards the wheel 5 can be turned and at the same time the quadrant *g* is rocked slightly by the movement of the lever *q*, disengaging the pawl *m* and allowing the unit drum to be moved. In that radius of each indicating drum which terminates with zero, is a pin 18 projecting from the drum or its snail, parallel with the axle *d*. This axle carries three corresponding

pins 19 projecting through longitudinal slots in collars surrounding the axle *d*. When the shaft is pressed to release the handle wheel 5, the pins 19 come into line with the pins 18 and when the axle *d* is rotated, they engage with each other and thus cause the indicating drums to revolve until all the drums are brought into the zero line when the stud 17 coming opposite its hole in the side *b* is drawn in by the pressure of the spring 6; at the same time the catch 7 again takes into its slot in the hand wheel and the unit drum is once more locked, all the drums shewing zero in the opening of the casing.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In an adding machine in which drums are rotated by the depression of levers, a bar which is raised by any of the levers and transfers the movement of the latter to the mechanism which drives the drums, each of the levers being of a length suitable to the extent to which it is required to raise the bar and having on its end a hook which engages with the bar and terminates the stroke of the lever while preventing overrunning of the driving mechanism, substantially as described.

2. Making the bar which is to be raised by the levers in steps each step engaging with the hooked end of a lever of varying length at the end of its stroke, the arrangement being such that all the levers have the same stroke, substantially as described.

3. The arrangement whereby the bar which is raised by the levers is returned by spring action and is brought to rest by a stop, substantially as described.

~~4. The device for returning the drums to zero, comprising a spring urged shaft on which the drums are mounted, passing through collars, having fixed on its one end a hand wheel and at suitable distances apart on it pins which project through slots in collars in such manner that when the shaft is moved against the spring pressure to unlock the wheel from its normal engagement with the frame and is then rotated, each of the pins engages with other pins mounted on the drums and rotate the drums until the wheel is automatically returned by the spring pressure to its locked position, substantially as described.~~

4. ~~5.~~ In a device such as *described for returning the drums to zero*, ~~is referred to in Claim 4,~~ a spring lever engaging in the wheel at the end of the spring urged shaft, the movement of which lever to unlock the *shaft* ~~wheel~~ also unlocks the unit drum to enable it to be turned by the pin on the spring urged shaft, substantially as described.

~~6.~~ *5.* An adding machine constructed and operating substantially as described.

Dated this 12th day of November, 1902.

ABEL & IMRAY,
Agents for the Applicant.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1906.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

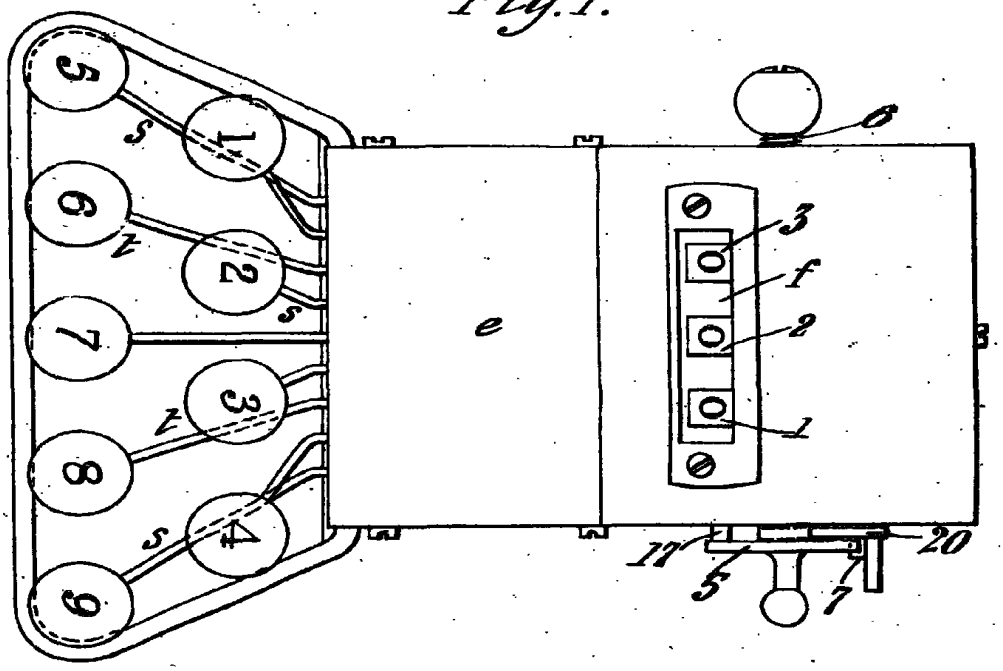
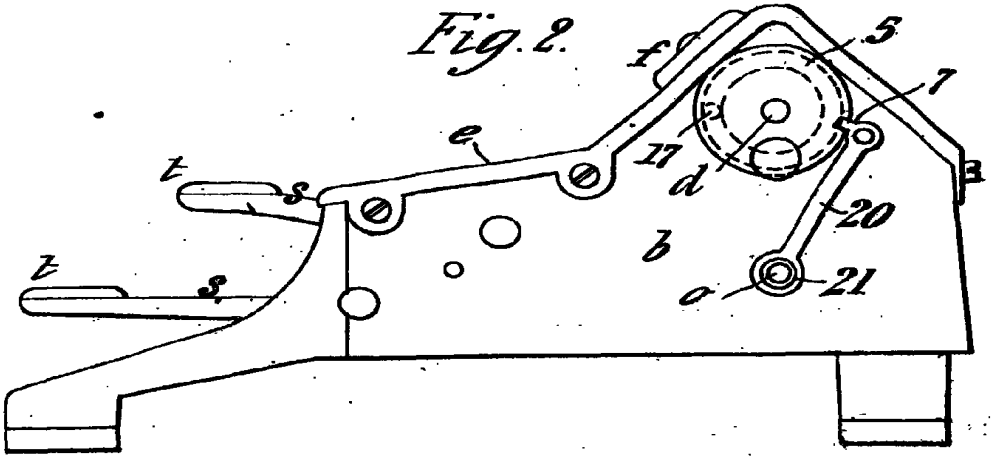


Fig. 2.

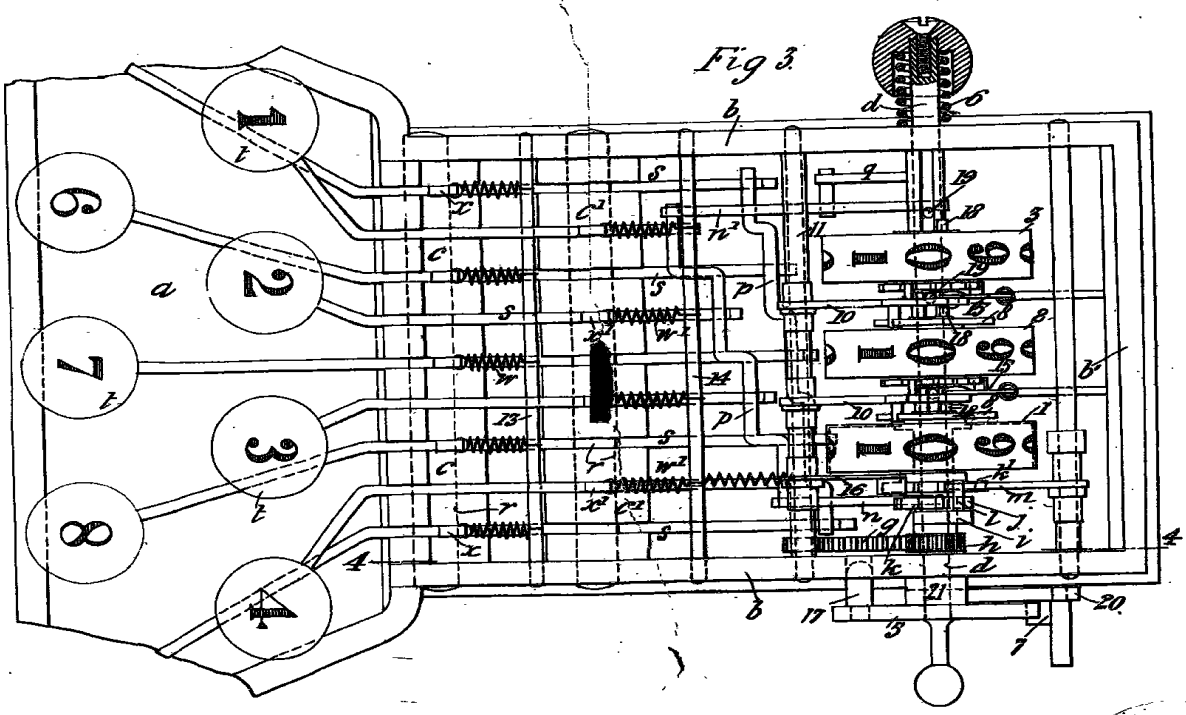


A.D. 1902. Nov. 12. N.º 24,868.*
POSTANS' AMENDED SPECIFICATION.

(3 SHEETS)
SHEET 2

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig 3.



Malby & Sons, Photo-Litho.

[This Drawing is a reproduction of the Original on a reduced scale.]

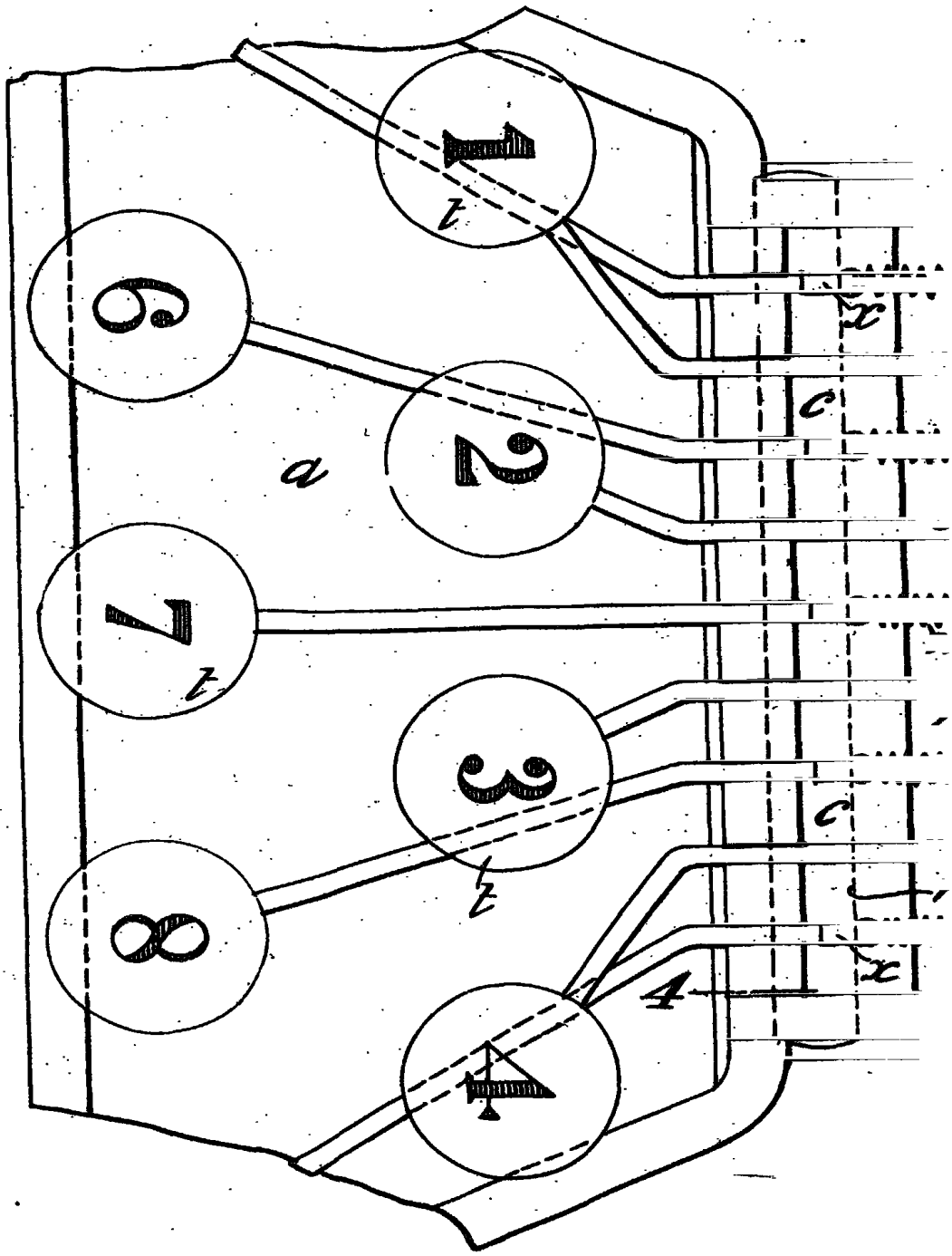
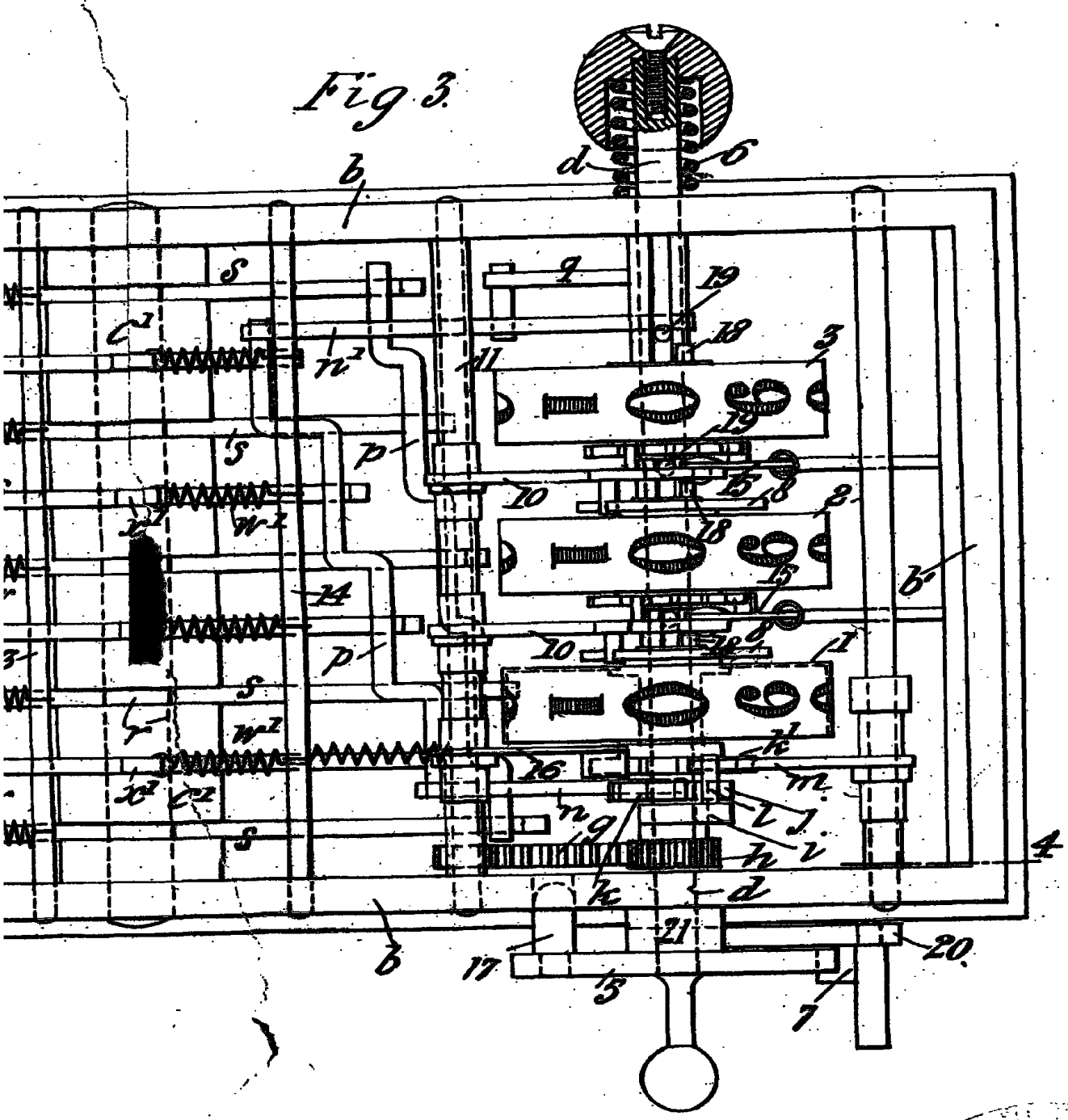


Fig 3.



A.D. 1902. Nov. 12. N° 24,868.*
POSTAN'S' AMENDED SPECIFICATION.

Fig. 5.

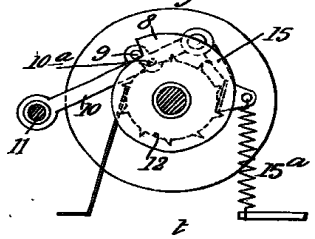


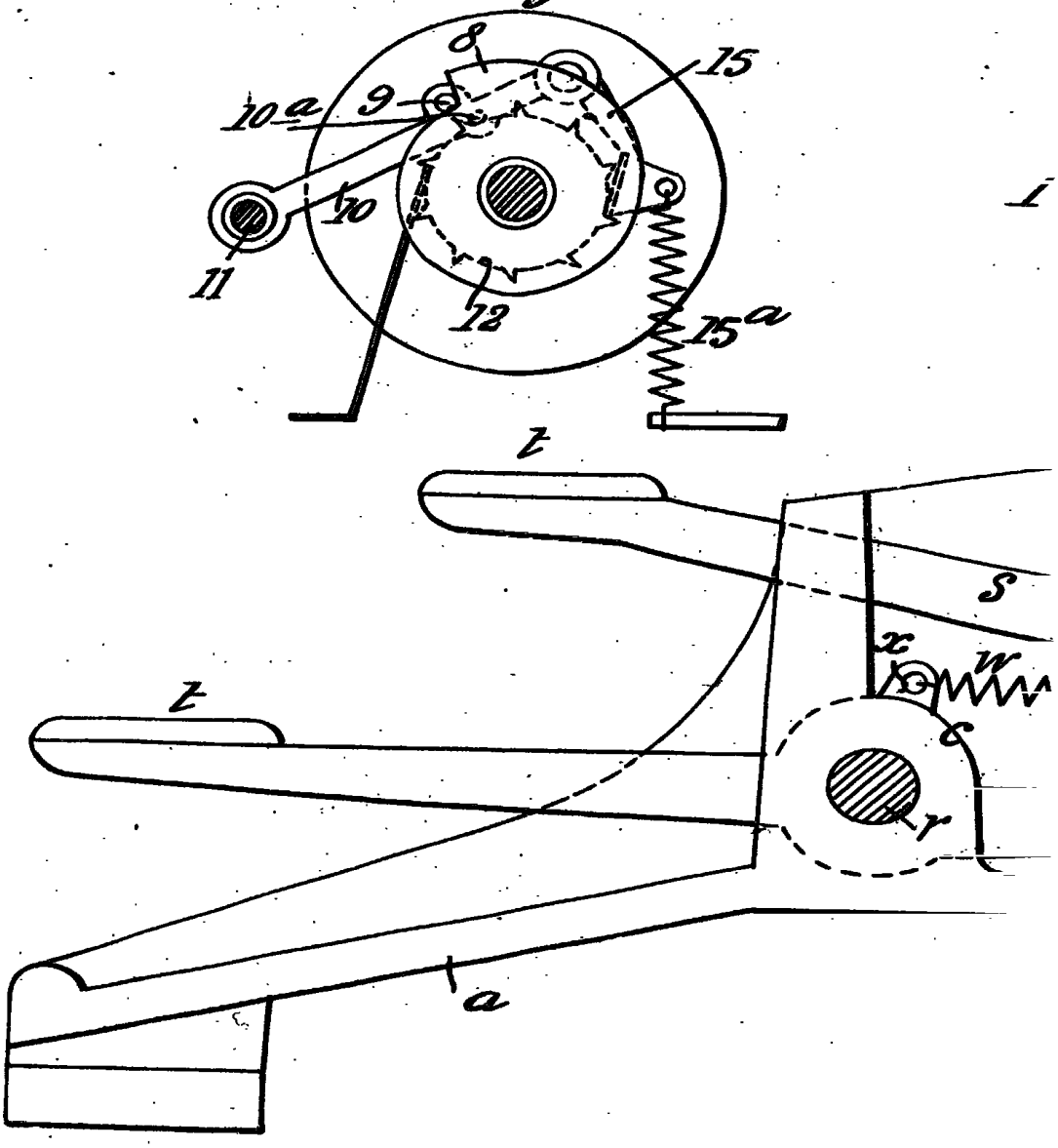
Fig. 4.

A.D. 1902. Nov. 12. N.° 24,368.*

POSTANS' AMENDED SPECIFICATION.

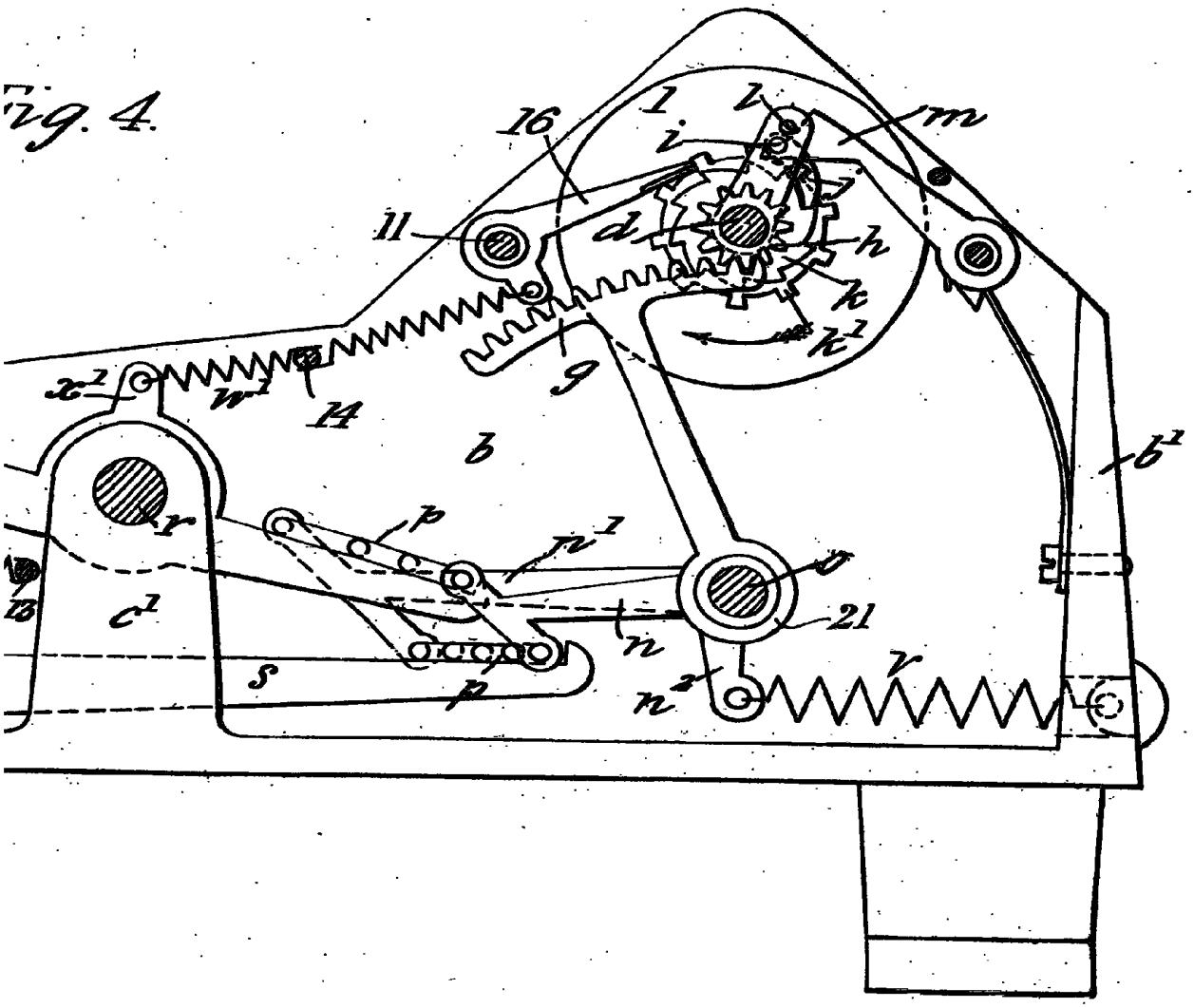
[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 5.



(3 SHEETS).
SHEET 3.

Fig. 4.



Malby&Sons, Photo-Litho.