997,441.

J. D. DAUGHERTY.

TYPE WRITING MACHINE.

APPLICATION FILED MAR. 16, 1911.

Patented July 11, 1911.

3 SHEETS—SHEET 1.

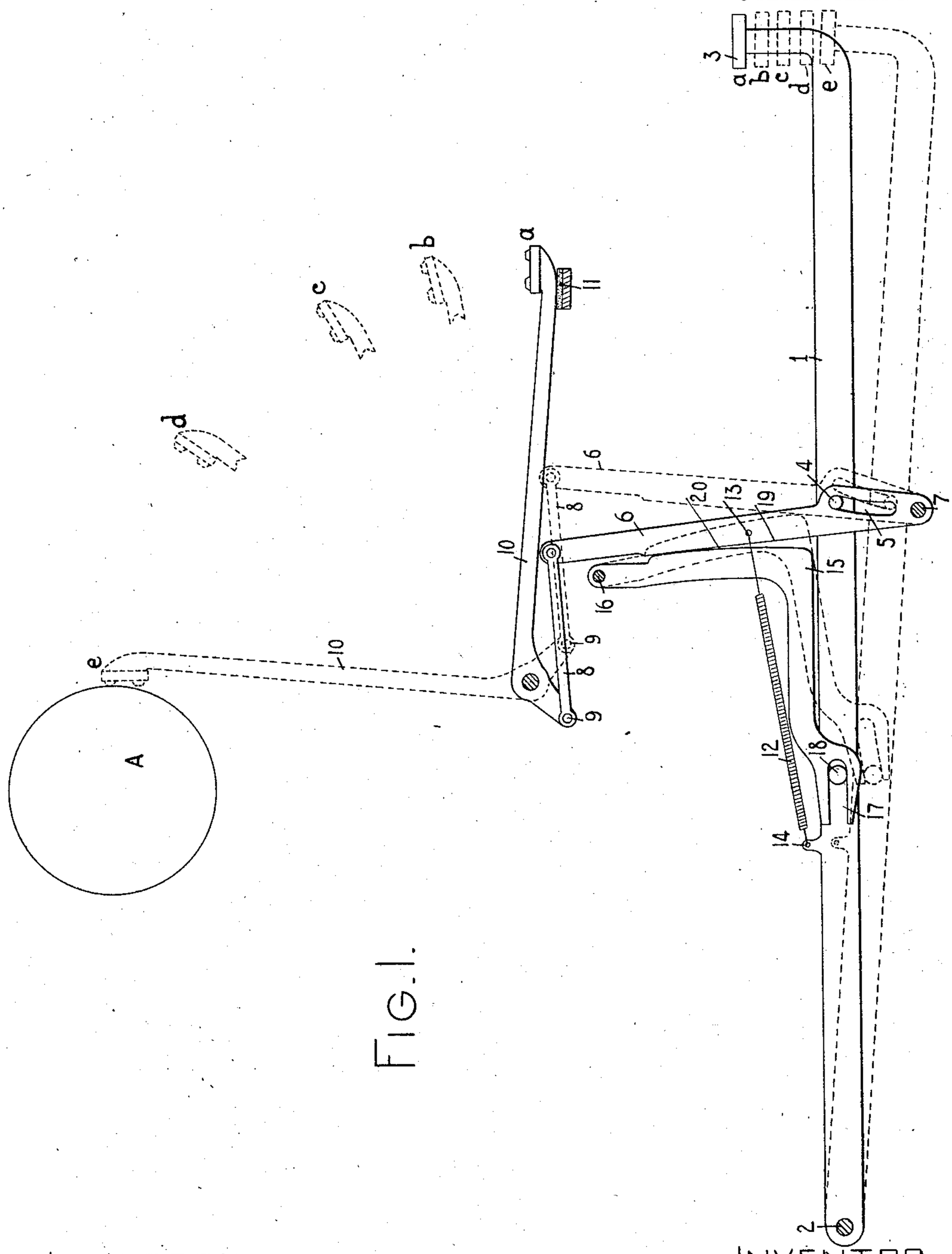

FIG. 1.

WITNESSES:

E. M. Wells.

Charles E. Smith

INVENTOR:

James D. Daugherty

By James Fillel

HIS ATTORNEY

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

997,441.

J. D. DAUGHERTY.

TYPE WRITING MACHINE.

APPLICATION FILED MAR. 16, 1911.

Patented July 11, 1911.

3 SHEETS—SHEET 2.

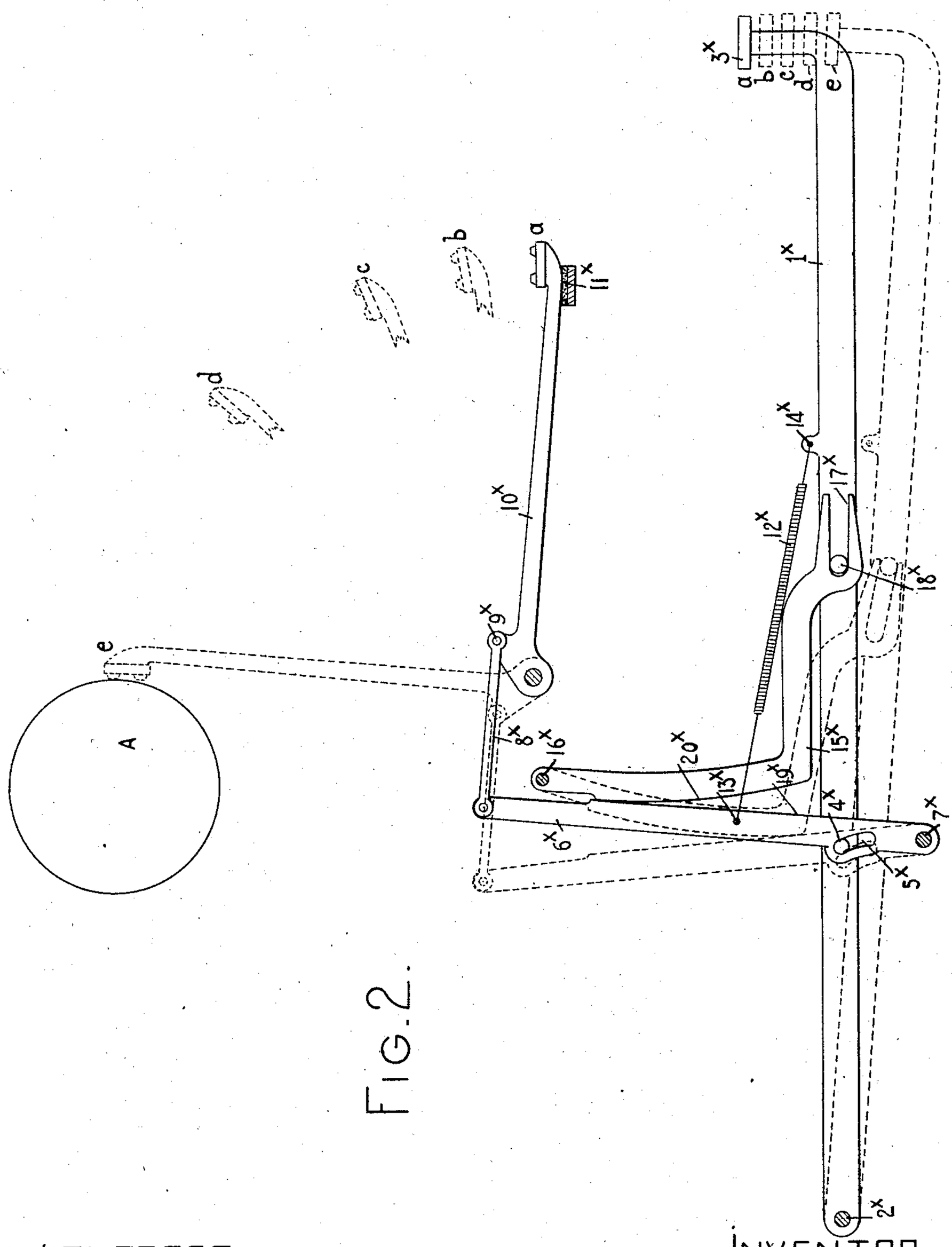

FIG. 2.

WITNESSES:

E. M. Wolle

Charles E. Smith

INVENTOR:

James D. Daugherty

By Jacob Felbel

HIS ATTORNEY

997,441.

J. D. DAUGHERTY.

TYPE WRITING MACHINE.

APPLICATION FILED MAR. 16, 1911.

Patented July 11, 1911.

3 SHEETS—SHEET 3.

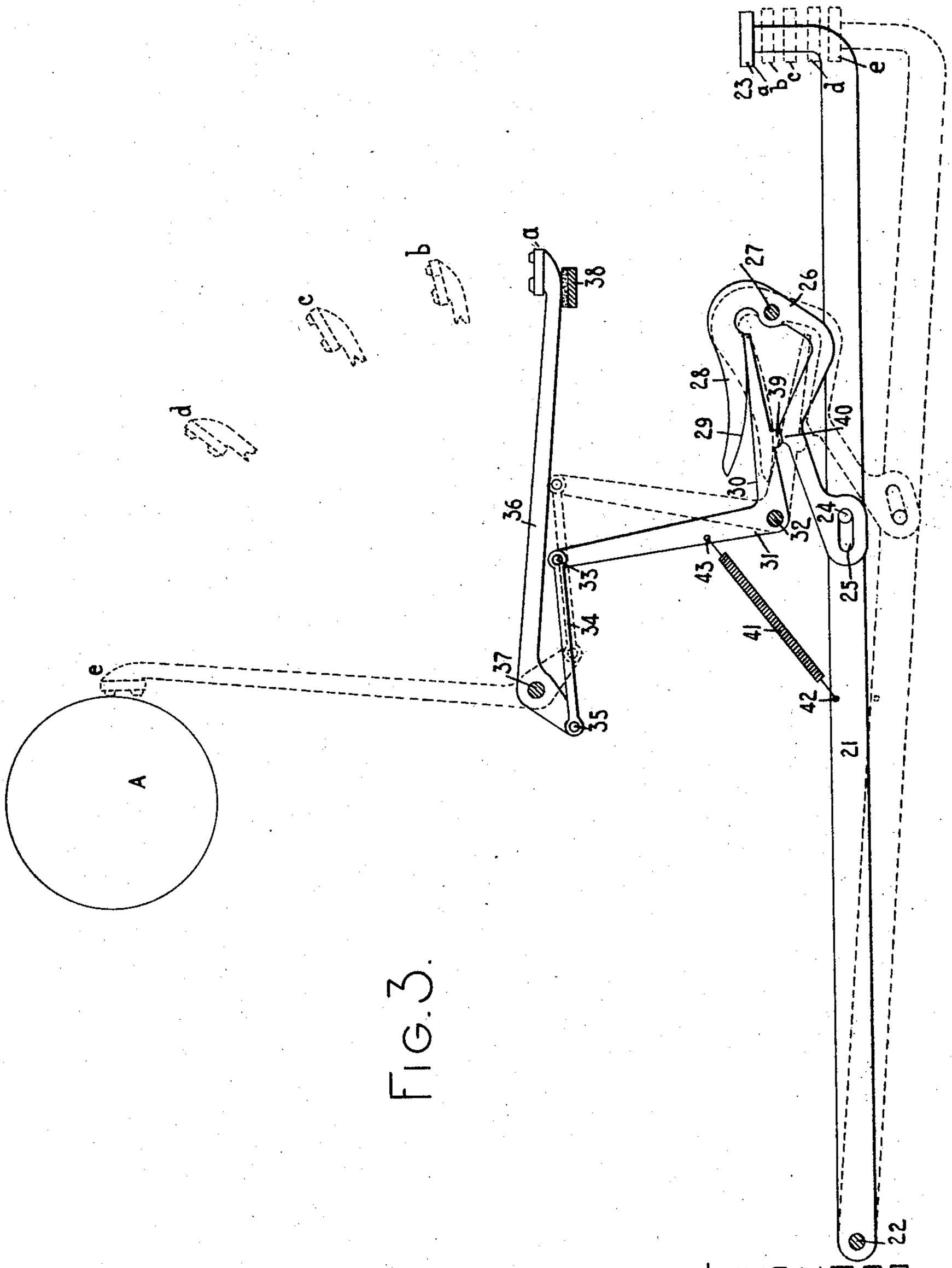

FIG. 3.

WITNESSES:

E. M. Wells

Charles E. Smith

INVENTOR:

James D. Daugherty

By Jacob Tell

HIS ATTORNEY

COLUMBIA PLANOGRAPH CO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES D. DAUGHERTY, OF KITTANNING, PENNSYLVANIA, ASSIGNOR TO UNION TYPE-WRITER COMPANY, OF ILION, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

997,441. Specification of Letters Patent. Patented July 11, 1911.

Application filed March 16, 1911. Serial No. 614,874.

To all whom it may concern:

Be it known that I, JAMES D. DAUGHERTY, citizen of the United States, and resident of Kittanning, in the county of Armstrong and State of Pennsylvania, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to type actions.

One of the main objects of my invention is to provide a type action which affords an easy start and in which the type bar receives an accelerated movement as it approaches the printing position.

A further object of my invention is to provide means whereby the type bars are locked or restrained against rebound from the normal position to prevent adjacent type bars from colliding at or near the basket.

To the above and other ends which will hereinafter appear my invention consists in the features of construction, arrangements of parts and combinations of devices to be set forth in the following description and particularly pointed out in the appended claims.

In the accompanying drawings wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a skeletonized side elevation showing one form of front-strike type action embodying my invention. Fig. 2 is a like view of a modified form of construction. Fig. 3 is a like view of a still further modified form of construction embodying my invention.

The present invention is in the nature of an improvement on the construction disclosed in my application, Serial No. 423,948, filed March 28, 1908 and also on my application, Serial No. 614,873, filed of even date herewith and has some of the same general objects in view as the inventions disclosed in said other applications. The claims of the present application are restricted to features not disclosed in either of the applications hereinbefore mentioned.

Referring particularly to Fig. 1, 1 designates a key lever of the second order fulcrumed at 2 and provided with the usual finger keys 3. Projecting laterally from the key lever is a pin 4 received in a slot 5 in a sub-lever 6 of the third order. This sub-lever is pivoted at 7 beneath the system of key levers on a fixed pivot and has an upwardly extending arm connected at its upper end to a pull link 8. The rear end of the link is pivoted at 9 to the crank arm of an upwardly and rearwardly striking type bar 10, which strikes against the front face of the platen A. The type bars are supported in their normal positions on a type rest 11. A contractile restoring spring 12 is connected at one end 13 to the sub-lever 6 and at its opposite end 14 to an upwardly extending ear on the key lever. A second sub-lever 15, angular in form, is fulcrumed at the upper end of its upwardly extending arm, as at 16, on a fixed pivot arranged above the key levers. The horizontally disposed and rearwardly extending arm of the second sub-lever is slotted horizontally at 17 to receive a pin 18 which projects laterally from the key lever. The two upright arms of the sub-levers 6 and 15 have coöperative contact or engaging faces 19 and 20 respectively. One of these contact faces (20 in the present instance) is curved so as to provide a rolling contact or fulcrum between the two sub-levers to afford a variation in leverage of one sub-lever on the other. It will be observed that during the depression of a key the rolling contact between the two sub-levers causes the engagement between said sub-levers to extend farther from the fixed fulcrum of the sub-lever 15 and to approach nearer to the fulcrum 7 of the sub-lever 6. In the operation of the type action motion is transmitted from the key lever to the sub-lever 15 through the pin and slot connection 18—17, and motion is transmitted from the angular sub-lever 15 to the sub-lever 6 through the rolling contact 19 and 20, to effect a forward movement on the pull link 8 and thus move the type bar to the printing point. During the depression of the key lever the pin 4 works idly in the slot 5; the movement of the pin 4 in the slot 5 of the sub-lever having no effect on the actuation of the sub-lever 6. The purpose of the pin and slot connection 4—5 is to lock the actuating connections so that the type bar is prevented from rebounding from the type rest 11 when the parts are in normal position. Thus, it will be understood that any tendency of the type bar to rebound exerts

a forward pressure on the pull link 8, and this movement is resisted by the pin 4 and the fulcrum 2 of the key lever which prevent a forward turning movement of the sub-lever 6 except when said sub-lever is actuated through the depression of the finger key 3. In other words, the tendency of the type bar to rebound tends to move the link 8 forwardly and to move the upper end of the sub-lever 6 forwardly on its pivot 7. This movement, however, is resisted by the pin 4 exerting a pressure longitudinally of the key lever against the pivot 2 of the key-lever.

It will be understood from a comparison of the finger key in the different positions shown at *a*, *b*, *c*, *d* and *e* with the positions of the type bar represented at *a*, *b*, *c*, *d* and *e*, respectively, that a gradual acceleration of the type bar is effected during the key depression and as the type bar approaches the printing position; the type bar being highly accelerated at the last portion of the printing stroke. The restoring spring 12, together with the weight of the returning type bar, tends to restore all of the parts to normal position; the pull exerted by the spring on the sub-lever 6 tending to force the sub-lever 15 and the key lever to normal position. Moreover, the pull of the spring is likewise exerted to lift the key lever and to maintain the rolling contact faces 19 and 20 in coöperative engagement. If desired, however, an additional restoring spring may be applied to the key lever to assist in returning the parts to their normal positions.

In Fig. 2 the parts are somewhat similar to those represented in the preceding figure, except that the parts are so arranged that the type bar is moved to the printing position by a backward pull on the type bar instead of a forward pull; the actuating devices between the finger key and type bar being changed accordingly. In this view the same reference numerals will be applied to corresponding parts as in the preceding figure with the addition thereto of the exponent *x*.

In Fig. 3 I have shown a still further modification of my invention in which a key lever 21 of the second order is pivoted at 22 and is provided with the usual finger key 23. A pin 24 projects laterally from the key lever and is received in a slot 25 in an angular sub-lever 26 pivoted at 27 on a fixed pivot arranged above the system of key levers. The angular sub-lever 26 has an arm 28 which extends rearwardly and is provided with a curved contact face 29 which cooperates with a contact face 30 on a second sub-lever 31 which turns on a fixed fulcrum or pivot 32 arranged above the system of key levers. The sub-lever 31 is, in this instance, also in the nature of an angular sub-lever and has its upright arm connected at 33 with a rearwardly extending pull link 34 pivoted at its rear end, as at 35, to the crank arm of a type bar 36. The type bars are each pivoted, as at 37, to swing upwardly and rearwardly and to strike against the front face of the platen A. The type bars are normally supported on a type rest 38. The horizontally disposed arm of the angular sub-lever 31 is provided with a projection or contact portion 39 which, when the parts are in normal position, engages the sub-lever 26 at 40. A contractile restoring spring 41 is connected at one end to the key lever at 42 and is connected at its opposite end at 43 to the upright arm of the sub-lever 31.

The construction and arrangement of the parts in this modified form are such that a considerable resistance is offered to the rebound of the type bar from the type rest 38, although the type bars are not positively locked against rebound. In this construction, like those previously described, an easy start of the type bar is afforded at the initial portion of the key depression, the type bar being gradually accelerated in its movement to the printing position. This will be clearly understood by a comparison of the different positions of the key indicated at *a*, *b*, *c*, *d* and *e* with the positions of the type bar indicated at *a*, *b*, *c*, *d* and *e* respectively. From these it will be seen that the construction is such that the curved contact face 29 on the sub-lever 26 gradually approaches the fulcrum 32 of the sub-lever 31, affording a light touch at the initial portion of the key depression and gradually accelerating the type bar in its movement as it approaches the printing position, a high acceleration of the type bar being effected at the last part of the printing stroke.

When I refer herein to the two sub-levers of each type action engaging each other by a "rolling contact" or as "having a rolling contact on each other" I mean a rolling engagement such as that provided between the contact faces 19 and 20, for example, as distinguished from a sliding contact such as may be provided by a pin and slot connection.

Various changes may be made without departing from the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a typewriting machine, the combination of a type bar; a finger key; and intermediate actuating connections between the type bar and finger key, said actuating connections comprising two sub-levers operatively connected with the finger key and type bar, the construction and arrangement of the parts being such as to prevent a rebound of the type bar from normal position.

2. In a typewriting machine, the combination of a type bar; a key lever; and intermediate actuating connections between

the key lever and type bar; said intermediate actuating connections comprising two sub-levers operatively connected to the type bar and key lever and one of said sub-levers having a rolling contact on the other to afford an acceleration of the type bar in its movement to the printing position, the construction and arrangement of the parts being such that the type bar is locked against rebound from the normal position.

3. In a front-strike typewriting machine, the combination of an upwardly and rearwardly striking type bar; a key lever; and intermediate actuating connections between said key lever and type bar, said actuating connections comprising two sub-levers having a rolling contact one on the other and one of said sub-levers being an angular lever connected by a pin and slot connection with the key lever, the parts being constructed and arranged so that the type bar is locked against rebound when in the normal position.

4. In a typewriting machine, the combination of a type bar; a key lever; intermediate actuating connections between the type bar and key lever comprising two coöperative sub-levers each having a rolling contact on the other, and a restoring spring connected to one of said sub-levers and the key lever to return the parts to normal position.

5. In a front-strike typewriting machine, the combination of an upwardly and rearwardly swinging type bar; a key lever; intermediate actuating connections between said key lever and type bar, said actuating connections comprising two sub-levers operatively connected to the type bar and key lever, one of said sub-levers having an upright arm, a link connecting said upright arm to the type bar, and the other of said sub-levers being an angular lever connected directly to the key lever by a pin and slot connection; and a contractile restoring spring connected at one end to said upright arm and at its opposite end to the key lever.

6. In a front-strike typewriting machine, the combination of an upwardly and rearwardly swinging type bars; a key lever; and intermediate actuating connections between said key lever and type bar, said actuating connections comprising two sub-levers having a rolling contact one on the other and having operative connection with the type bar and key lever, one of said sub-levers having an upright arm, a link connecting said upright arm to the type bar, and the other of said sub-levers being an angular lever connected directly to the key lever by a pin and slot connection, the parts being constructed and arranged to lock the type bar against rebound in its normal position.

7. In a front-strike typewriting machine, the combination of an upwardly and rearwardly swinging type bar; a key lever; intermediate actuating connections between said key lever and type bar, said intermediate actuating connections comprising two sub-levers having a rolling contact one on the other to afford a gradual acceleration of the type bar in its movement to the printing position, one of said sub-levers having an upright arm, a link connecting said upright arm to the type bar and the other of said sub-levers being an angular lever connected to the key lever by a pin and slot connection; and a restoring spring connected at one end to said upright arm and at its opposite end to the key lever, the construction and arrangement of the parts being such that the type bar is locked against rebound in its normal position.

8. In a front-strike typewriting machine, the combination of an upwardly and rearwardly striking type bar; a key lever; intermediate actuating connections between the type bar and key lever, said connections comprising two sub-levers, each having a rolling contact on the other to afford a gradual acceleration of the type bar in its movement to the printing position, a pull link connecting said upright arm with the type bar, the other sub-lever being in the nature of an angular lever pivoted to turn on a fixed fulcrum, a pin and slot connection between said angular sub-lever and the key lever; and a contractile restoring spring connected at one end to said upright arm and at its opposite end to the key lever.

9. In a typewriting machine, the combination of a type bar; a key lever; intermediate actuating connections between said key lever and type bar, said intermediate actuating connections comprising a sub-lever, a pin and slot connection between said key lever and sub-lever, said pin and slot connection being so disposed as to operate idly at the depression of the key and to lock the type bar against rebound in the normal position of the parts, and means other than said pin and slot connection for transmitting movement from the key lever to the type bar.

10. In a typewriting machine, the combination of a type bar; a key lever; intermediate actuating connections between said key lever and type bar, said intermediate actuating connections comprising a sub-lever connected with the type bar, a second sub-lever connected with the key lever and by which the first mentioned sub-lever is actuated; and a pin and slot connection which works idly at the depression of a key but locks the type bar against rebound when the latter is in the normal position.

11. In a typewriting machine, the combination of a type bar; a key lever; intermediate actuating connections between said key lever and type bar, said intermediate actuating connections comprising a sub-lever connected with the type bar, a second sub-lever connected with the key lever and

by which the first-mentioned sub-lever is actuated by a rolling engagement or contact between said sub-levers; and a pin and slot connection which works idly at the depression of a key but locks the type bar against rebound when the latter is in the normal position.

Signed at Kittanning, in the county of Armstrong, and State of Pennsylvania, this 8th day of March, A. D. 1911.

JAMES D. DAUGHERTY.

Witnesses:
HARRY P. BOARTS,
VERNA D. DAUGHERTY.