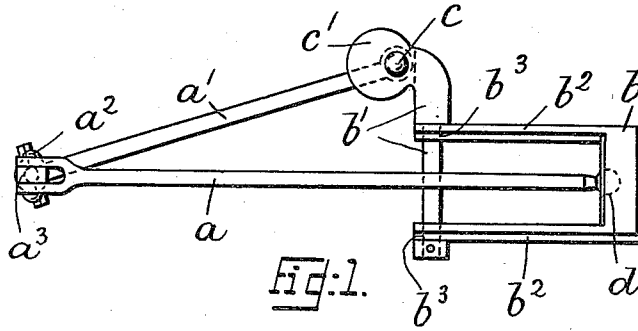
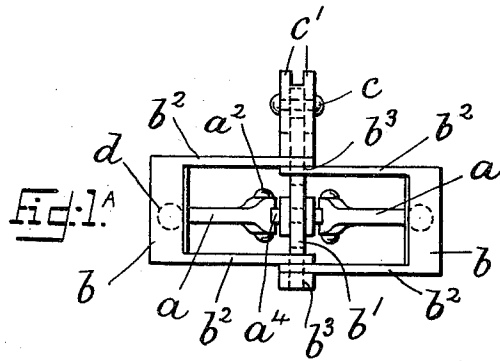
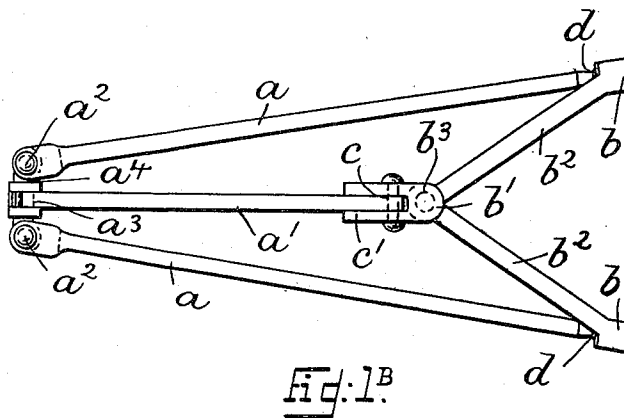


W. V. GILBERT.
COMPOUND LEVER.
APPLICATION FILED JUNE 10, 1911.

1,083,084.

Patented Dec. 30, 1913.

4 SHEETS—SHEET 1.



WITNESSES
F. B. Barry
Edw. M. Callaghan

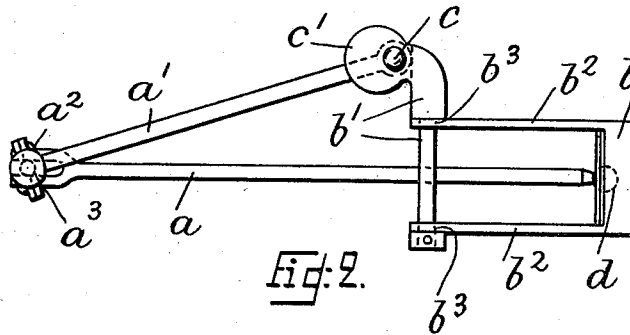
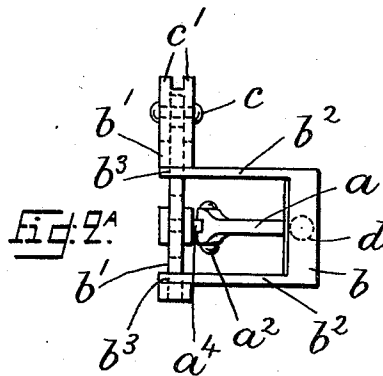
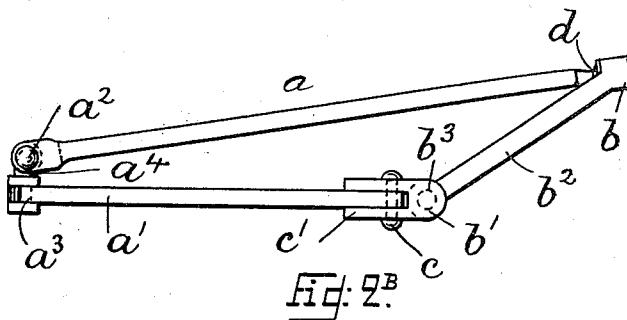
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4 SHEETS—SHEET 2.



WITNESSES
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4 SHEETS—SHEET 3.

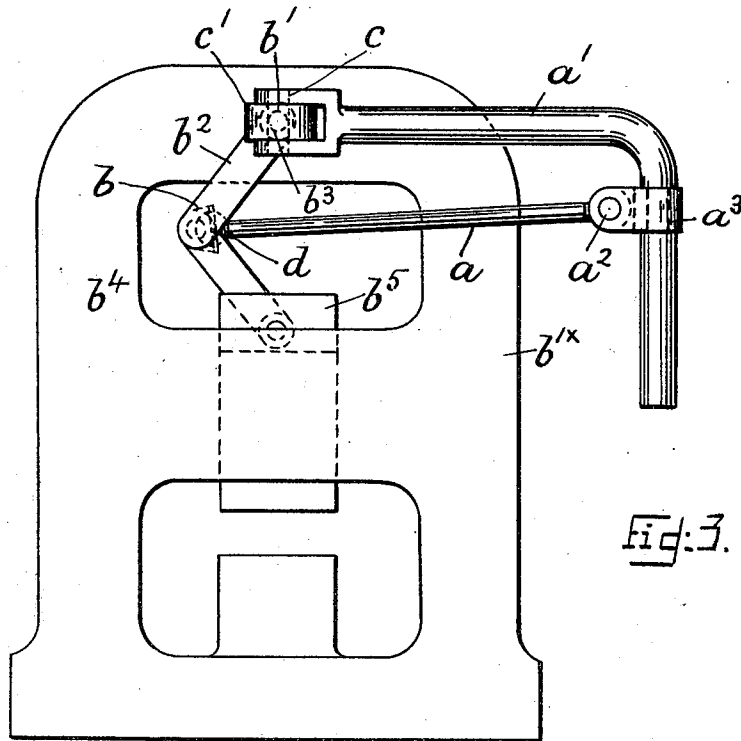


Fig. 3.

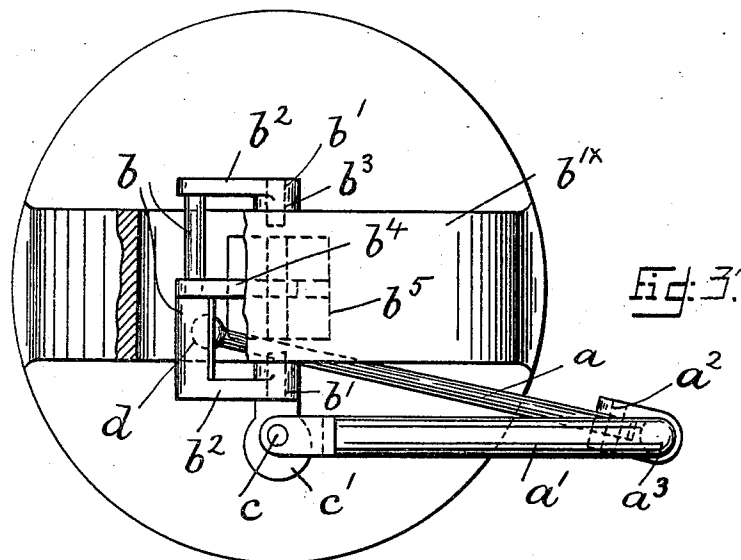


Fig. 3^A.

WITNESSES
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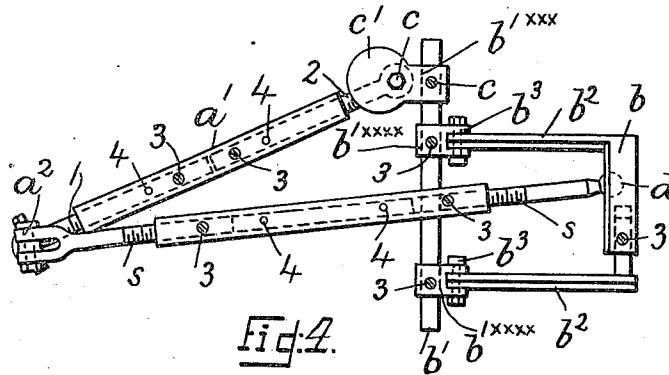
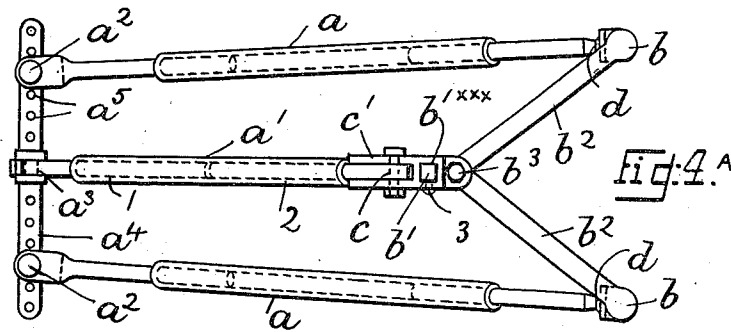
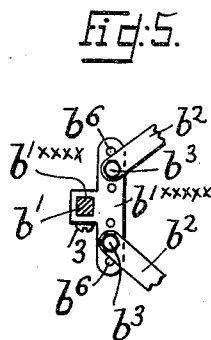
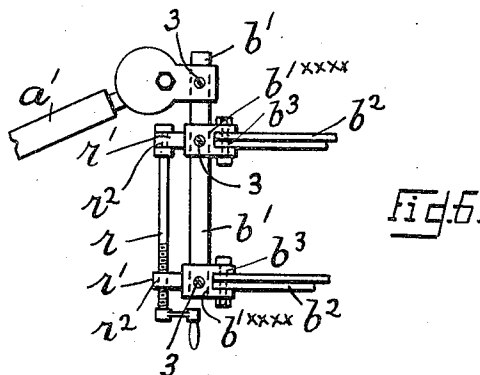
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APPLICATION FILED JUNE 10, 1911.

1,083,084.

Patented Dec. 30, 1913.

4 SHEETS—SHEET 4.



WITNESSES
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UNITED STATES PATENT OFFICE.

WALTER VILLA GILBERT, OF LONDON, ENGLAND.

COMPOUND LEVER.

1,083,084.

Specification of Letters Patent.

Patented Dec. 30, 1913.

Application filed June 10, 1911. Serial No. 632,401.

To all whom it may concern:

Be it known that I, WALTER VILLA GILBERT, a subject of the King of Great Britain and Ireland, and a resident of London, England, have invented certain new and useful Improvements in Compound Levers; and I do hereby declare the following to be a full, clear, and exact description of the same.

10 This invention relates to improvements in or modifications of compound levers for transforming or transferring reciprocating or oscillating movement or motion in or from one plane into reciprocating or oscillating movement in a second plane lying at an angle to the first, comprising a rigid member adapted to turn in the first plane about a stationary axis supported by a basic member, a second rigid member adapted to turn in the second plane about a second stationary axis supported by the basic member, and a rigid interconnecting link jointed at its opposite ends to said first and second members.

25 The present invention has for its objects, to construct a compound lever which will be compact and will enable the equivalent of an almost completely extended long limbed toggle to be utilized in the transmission of movement, so that an efficient and sustained leverage is available, and which may be adjustable to enable different operations to be obtained from a given actuation.

35 According to the present invention, a compound lever for the purpose aforesaid consists of a basic member, rigid back-end-members (or one such member) adapted to turn in one plane about a stationary axis supported by the basic member, a rigid arm-primary-member having its forward end free and adapted to turn in the other plane about a stationary axis supported by the basic member at the rearward end of the arm-primary-member, and rigid arm-secondary-members (or one such member) connected, at one end at or near to the forward end of the arm-primary-member and at the other end to the back-end-members (or member), by articulative means permitting each (or the) arm-secondary-member during its operation to assume different angular relations to both said planes, the construction and combination of parts being such that each (or the) member turning in one plane and each (or the) arm-secondary-member in operation maintain acute angular relations to

one another and to the plane in which each (or the) other member turns.

The invention further consists in constructing such a compound lever in which some or all of its members or articulative connections are adjustable in themselves or in relation to one another.

The invention is illustrated in the accompanying drawings, in which:—

Figures 1, 1^A, 1^B are respectively a side elevation, a rear elevation, and a plan of a modification having two back-end-members and two arm-secondary-members; Figs. 2, 2^A, 2^B are similar views of a modification having one back-end-member and one arm-secondary-member; Figs. 3, 3^A are respectively a front elevation, and a plan, showing an industrial application of the modification represented in Figs. 2, 2^A, 2^B; Figs. 4, 4^A are respectively a side elevation, and a plan of a modification having members or parts which are adjustable; Fig. 5 is a plan of a detail; and Fig. 6 is an elevation of a detail.

Like reference letters indicate like parts wherever repeated in the drawings.

In carrying out the invention, referring particularly to Figs. 1 to 2^B, a compound lever is composed of a back intermediary or basic member, *b*¹; rigid back-end-members (Fig. 1^B), or one such member (Fig. 2^B), each consisting or the one consisting of a side-part, *b*², or side and end parts, *b*²—*b*, respectively, adapted to turn in one plane about the member, *b*¹, or about an axis supported thereby, as at *b*³; a rigid arm-primary-member, *a*¹, having its forward end free, and adapted to turn in another plane at an angle to the plane of turning of the back-end members or member about an axis, *c*, supported by the back intermediary or basic member, at the rearward end of the arm-primary-member, and controlled in so doing by guides, *c*¹, or in other suitable manner; and rigid arm-secondary-members, *a*, (Fig. 1^B), or one such member (Fig. 2^B), connected by suitable articulative means, say, by hinge-like joints, *a*², *a*³, and end-pieces, *a*⁴, at one end to the forward end of the arm-primary-member, and by ball-and-socket joints, *d*, at the other end to the back-end-members (Fig. 1^B), or member (Fig. 2^B) respectively on opposite sides or on one side of the axis of turning, *b*³. When such respective devices are actuated by the arm, the back-end members or member will be caused

- to operate, for example, the actuation of the arm by a reciprocating or oscillating movement will cause or impart a reciprocating or oscillating movement of or to the back-end members or member in a plane at an angle to the plane of actuation and in a different direction, the lever action providing the equivalent of an almost completely extended long limbed toggle.
- Referring more particularly to Figs. 3, 3^A, which illustrate an embodiment of the device represented in Figs. 2 to 2^B, for use as a press or the like, the back-end-member, b^2-b , is mounted on a stud, b^1 , supported on the machine-frame, b^{1x} . The arm-primary-member, a^1 , is pivotally mounted, as at c , at its rearward end on a projecting part of the stud, b^1 , or on the machine-frame, and is controlled by a guide, c^1 , with facility of reciprocating or oscillating movement in a plane at right angles to the plane of movement of the back-end-member, b^2-b . The arm-secondary-member, a , is connected to the free ends of the arm-primary-member, a^1 , which serves as a handle, and of the back-end-member, by suitable joints, a^2, a^3, d , which accommodate the relative movements of the parts. The free end of the back-end member is pivoted to a link, b^4 , so as to form a toggle connected to a die-block, b^5 , guided vertically in the machine-frame. Thus, the die is reciprocated vertically as the arm-primary-member, a^1 , is reciprocated or oscillated horizontally.
- Referring more particularly to Figs. 4, 4^A, the arm-intermediary-member may be made of a rigid nature but extensible and collapsible in length. This may be effected by making it of sections, 1, 2, which telescope, slide, or are equivalently adjustable in relation to one another. The sections may be set or fixed so as to form a member of any desired length, by means of pins, screws or the like, 3, engaging holes, or recesses or the like, 4, in the sections, or by lock nuts adapted to clamp split end-parts of the outer telescopic section against the inner telescopic section, or in any other convenient manner.
- In a similar manner to that just described, the end parts or part of the back-end members or member, b , may be made adjustable in length, and the side parts or part of the back-end members or member may be adjustable in length. The back intermediary or basic member, b^1 , is preferably made integral throughout its length. The forward ends of the side and intermediary members, a, a^1 , of the arm may be connected to a transverse end-piece or link a^4 , adjustable in length or provided with a plurality of points, a^5 , along its length to which the forward ends of the arm-side members or member, a , may be pivotally connected.
- The articulative connection of the rearward end of the arm-intermediary-member, a^1 to the back intermediary or basic member b^1 , may be slidably mounted in relation to the latter, as at b^{1xxx} , and adapted to be secured in various positions by locking means, 3. The articulative connection of the back-end members or member, b^2-b , to the back intermediary or basic member, b^1 , may be similarly mounted, as at b^{1xxxx} . When two back-end-members are employed, the connections, b^3 , may be arranged co-axially (Figs. 4, 4^A), or eccentrically or spaced apart by means of a rigid spreader, b^{1xxxxx} , (Fig. 5), adjustable in length or provided with a plurality of points, b^6 , along its length to which the back-end-members, b^2-b , may be pivotally connected. The articulative connection of the rearward ends of the arm-side members or member, a , and the back-end members or member may be slidably mounted on the latter, if the desired adjustment is not attainable by extension or collapse of the end-parts of the back-end-members, as aforesaid.
- The various adjustments, *inter alia*, enable the arm to be lengthened, or shortened, or bodily located at different positions relative to the back intermediary or basic member, b^1 , and enable the points of connection of the arm-side members or member on opposite sides or on one side of the axis of turning, b^3 , to be varied in relation to the axis of turning of the arm-intermediary-member, whereby various operations of the device may be predetermined from a given actuation.
- To enable the various members of the device to be readily set to any predetermined length or inter-relation, for any particular work or operation the device may be desired to perform, the sections or parts which slide or are adjustable on one another may be ruled with a scale, as indicated at s .
- Special means may be provided, such as screw-threaded rods, r , mounted in brackets, r^1 , parallel or in other suitable relation to certain members of the device, for example, the back intermediary or basic member, and engaging the articulative connections, as at r^2 , for facilitating or effecting their adjustment.
- What I claim as my invention and desire to secure by Letters Patent is:
1. A compound lever for transforming reciprocating movement from one plane to another lying at an angle and in a different direction to the first, consisting of a basic member, a rigid back-end-member adapted to turn in one plane about a stationary axis supported by the basic member, a rigid arm-primary-member having its forward operable end free and adapted to turn in the other plane about a stationary axis supported by the basic member at the rearward end of the arm-primary-member and ad-

5 adjacent to the axis of the back-end-member, a
rigid arm-secondary-member connected, at
one end at or near to the forward end of the
arm-primary-member and at the other end
to the back-end-member, and articulative
means at such connections, the arm-primary-
member and the arm-secondary-member
being arranged and combined so as to
maintain acute angular relations to one
10 another and to the plane in which the back-
end-member turns, substantially as de-
scribed.

2. A compound lever for transforming re-
ciprocating movement from one plane to an-
15 other lying at an angle and in a different
direction to the first, consisting of a basic
member, a rigid back-end-member adapted
to turn in one plane about a stationary axis
supported by the basic member, a rigid arm-
20 primary-member having its forward oper-
able end free and adapted to turn in the
other plane about a stationary axis support-
ed by the basic member at the rearward end
of the arm-primary member and adjacent
25 to the axis of the back-end-member, a rigid
arm-secondary-member connected, at one
end at or near to the forward end of the
arm-primary-member and at the other end
to the back-end-member, and articulative
30 means at such connections, the arm-primary-
member and the arm-secondary-member
being arranged and combined so that at one
time the arm-primary-member is parallel to
the plane in which the back-end-member
35 turns, and at all other times the arm-pri-
mary-member and the arm-secondary-mem-
ber maintain acute angular relations to one
another and to the plane in which the back-
end-member turns, substantially as de-
40 scribed.

3. A compound lever for transforming re-
ciprocating movement from one plane to an-
other lying at an angle and in a different
45 direction to the first, consisting of a basic
member, a rigid back-end-member adapted
to turn in one plane about a stationary axis
supported by the basic member, a rigid arm-
primary-member having its forward end
free and adapted to turn in the other plane
50 about a stationary axis supported by the
basic member at the rearward end of the
arm-primary-member, a rigid arm-second-
ary-member connected, at one end at or
near to the forward end of the arm-primary-
55 member and at the other end to the back-
end-member, and articulative means com-
prising a ball-and-socket-joint at such con-
nections, the arm-primary-member and the
arm-secondary-member being arranged and
60 combined so as to maintain acute angular
relations to one another and to the plane in
which the back end member turns, substan-
tially as described.

4. A compound lever for transforming re-
65 ciprocating movement from one plane to

another lying at an angle and in a different
direction to the first, consisting of a basic
member, a rigid back-end-member adapted
to turn in one plane about a stationary axis
supported by the basic member, a rigid arm-
70 primary member having its forward end
free and adapted to turn in the other plane
about a stationary axis supported by the
basic member at the rearward end of the
arm-primary member, a rigid arm-second-
75 ary-member connected, at one end at or near
to the forward end of the arm-primary-
member and at the other end to the back-
end-member, and articulative means com-
prising a ball-and-socket-joint at one end of
80 the arm-secondary-member, and articulative
means comprising hingelike joints having
their pivots arranged at an angle to one an-
other at the other end thereof, the arm-pri-
85 mary-member and the arm-secondary-mem-
ber being arranged and combined so as to
maintain acute angular relations to one an-
other and to the plane in which the back
end member turns, substantially as de-
90 scribed.

5. A compound lever for transforming re-
ciprocating movement from one plane to
another lying at an angle and in a different
direction to the first, consisting of a basic
95 member, a rigid back-end-member adapted
to turn in one plane about a stationary axis
supported by the basic member, a rigid arm-
primary-member having its forward end
free and adapted to turn in the other plane
about a stationary axis supported by the
100 basic member at the rearward end of the
arm-primary-member, a rigid arm-second-
ary-member connected, at one end at or near
to the forward end of the arm-primary-
member and at the other end to the back
105 end-member, and articulative means at such
connections, the arm-primary-member and
the arm-secondary-member being arranged
and combined so as to maintain acute angu-
lar relations to one another and to the plane
110 in which the back end members turns, and
said members being adjustable, substantially
as described.

6. A compound lever for transforming re-
ciprocating movement from one plane to an-
115 other lying at an angle and in a different di-
rection to the first, consisting of a basic
member, a rigid back-end-member adapted
to turn in one plane about a stationary axis
supported by the basic member, a rigid arm-
120 primary-member having its forward end free
and adapted to turn in the other plane about
a stationary axis supported by the basic
member at the rearward end of the arm-pri-
mary-member, a rigid arm-secondary-mem-
125 ber connected, at one end at or near to the
forward end of the arm-primary-member
and at the other end to the back-end-mem-
ber, and articulative means at such connec-
tions, the arm-primary-member and the arm-
130

secondary-member being arranged and combined so as to maintain acute angular relations to one another and to the plane in which the back end member turns, and said
5 articulative means being adjustable, substantially as described.

7. A compound lever for transforming reciprocating or oscillating movement from one plane to another lying at an angle and
10 in a different direction to the first, consisting of a basic member, two rigid back-end-members adapted to turn in one plane about a stationary axis supported by the basic
15 member, a rigid arm-primary-member having its forward end free and adapted to turn in the other plane about a stationary axis supported by the basic member at the rearward end of the arm-primary-member, two

rigid arm-secondary-members connected, at their forward ends at or near to the forward end of the arm-primary-member and at their backward ends to the respective
20 back-end-members, and articulative means at such connections, the arm-primary-member and each arm-secondary-member being
25 arranged and combined so as to maintain acute angular relations to one another and to the plane in which the back end members turn, substantially as described.

In testimony whereof I affix my signature
30 in presence of two subscribing witnesses.

WALTER VILLA GILBERT.

Witnesses:

ALFRED DAY,
WALTER DAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."