

1,349,033.

E. W. ZEH.
POWER PRESS.
APPLICATION FILED NOV. 12, 1917.

Patented Aug. 10, 1920.

6 SHEETS—SHEET 1.

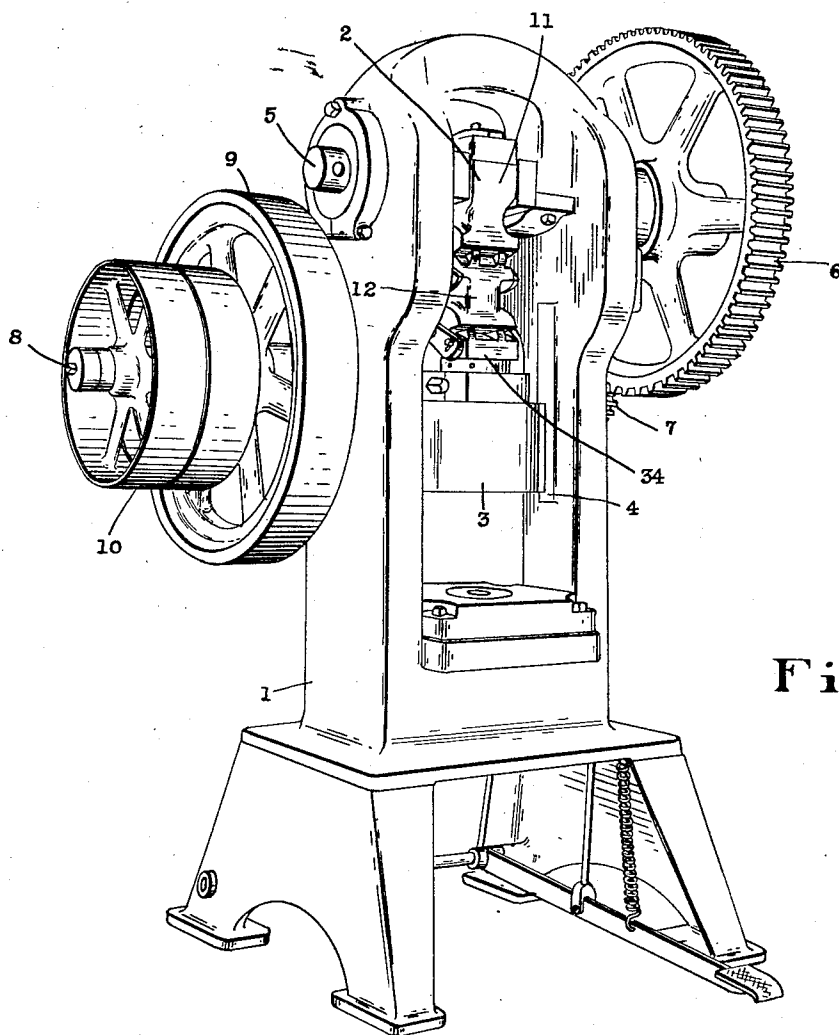


Fig. 1.

WITNESS

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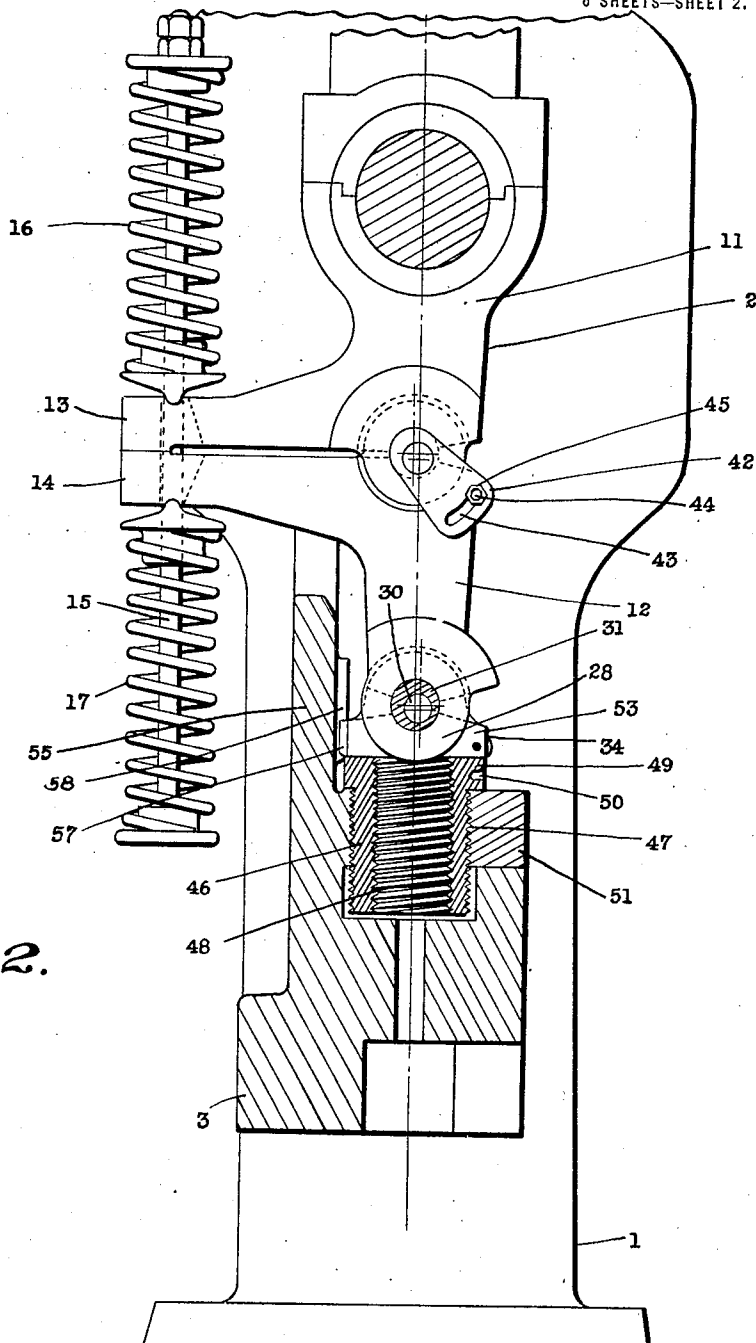


Fig. 2.

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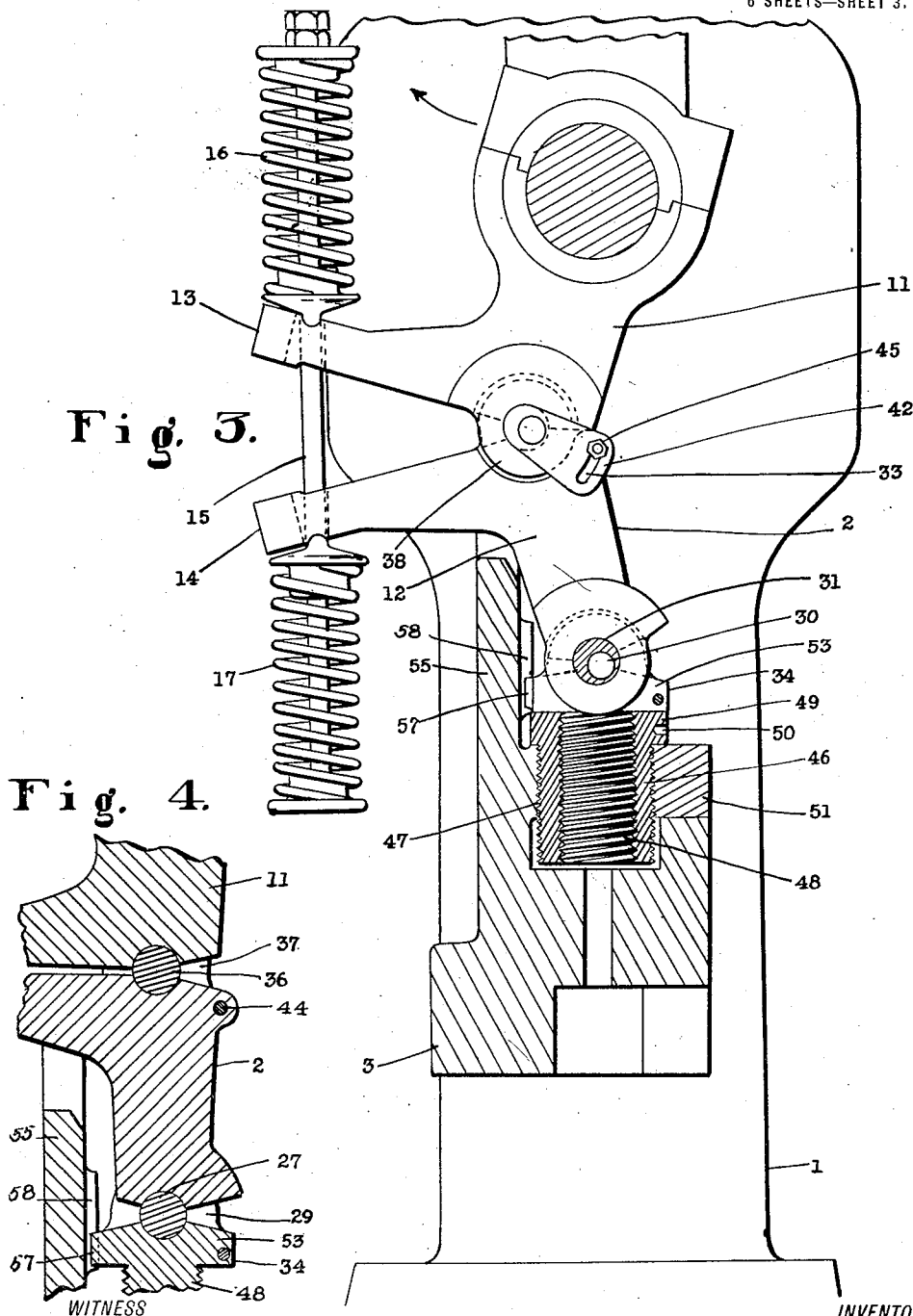
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6 SHEETS—SHEET 3.

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6 SHEETS—SHEET 4.

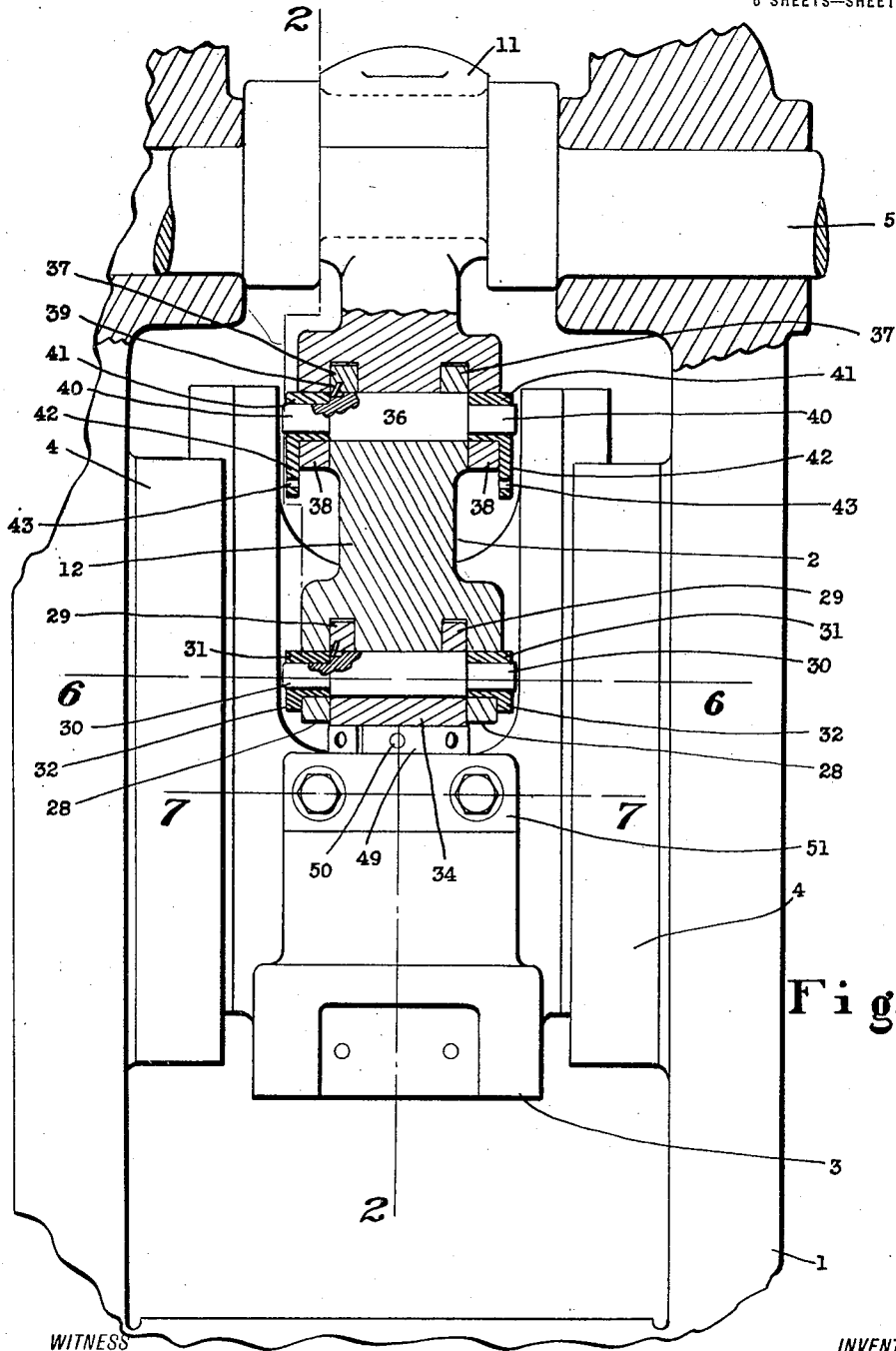


Fig. 5.

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6 SHEETS—SHEET 5.

Fig. 6.

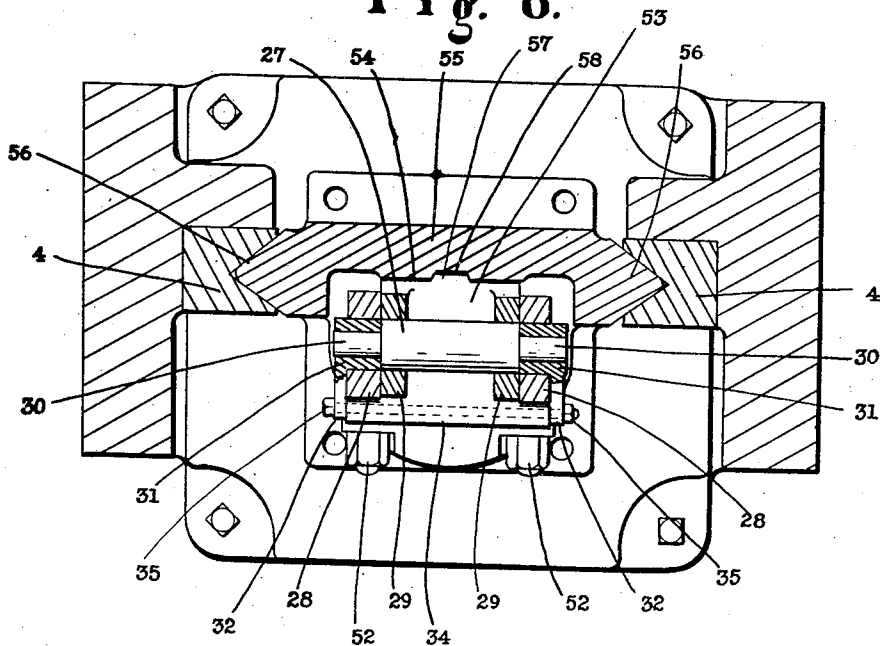
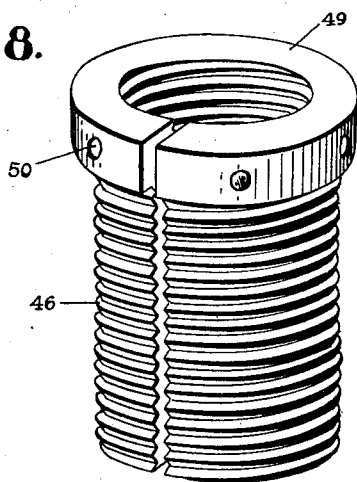


Fig. 8.



WITNESS

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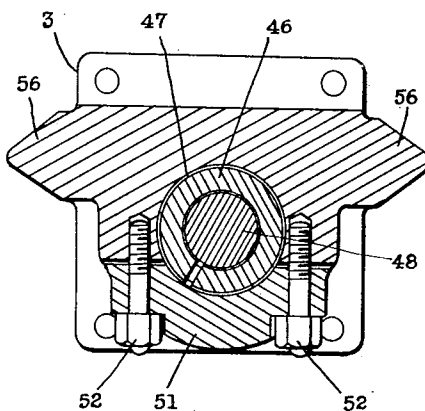


Fig. 7.

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6 SHEETS—SHEET 6.

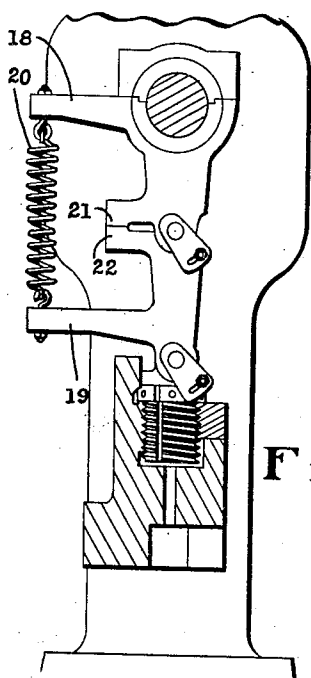


Fig. 9.

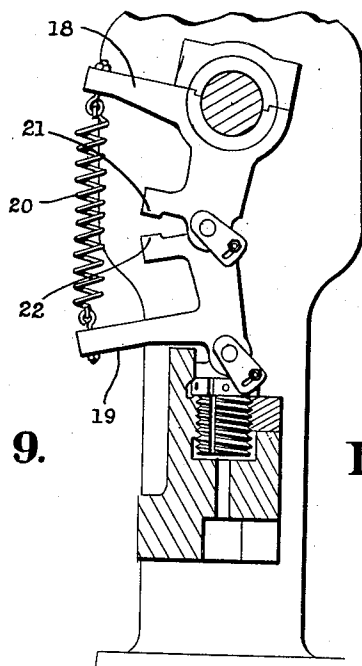


Fig. 10.

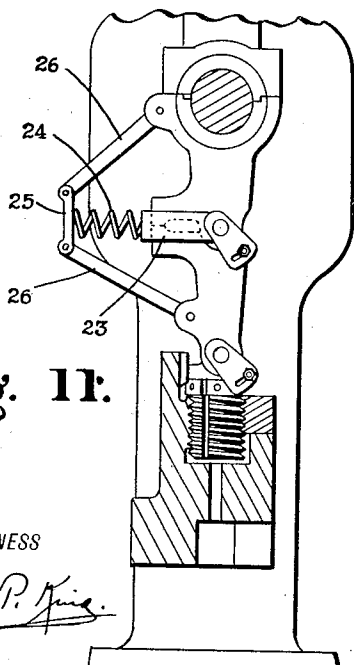


Fig. 11.

WITNESS

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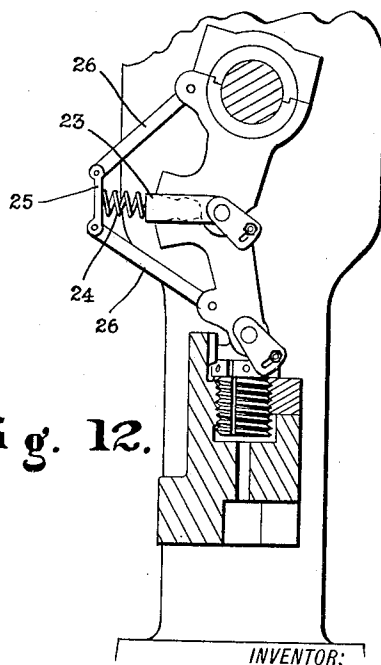


Fig. 12.

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UNITED STATES PATENT OFFICE.

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POWER-PRESS.

1,349,033.

Specification of Letters Patent. Patented Aug. 10, 1920.

Application filed November 12, 1917. Serial No. 201,690.

To all whom it may concern:

Be it known that I, EDMUND W. ZEH, a citizen of the United States of America, and a resident of Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Power-Presses, of which the following is a specification.

The objects of this invention are to provide in a power press improved means which will yield if pressure of the slide or ram toward the lower die exceeds a certain limit, and thus prevent damage or breakage; to provide for this purpose means which not only resist separation of the hinged members but also tend to restore them to their initial position; to provide the hinged ends of said members with projections extending in the same direction and provided with means for resiliently tending to hold them in abutment; to more specifically provide said arms with a rod extended through them both and having at one or both of its ends a compression spring abutting against the adjacent arm so as to exert the desired spring pressure; to arrange said hinged parts in such a manner that rotation of the crank to oscillate the pitman will tend to assist yielding of the pitman under excessive load; to provide means for taking up wear at the hinge joints; to provide improved means for adjusting the slide or ram with respect to the pitman, and locking the same in fixed position; to counteract the lateral thrust of the down stroke upon the slide or ram; to secure simplicity of construction and operation, and to obtain other advantages and results as may be brought out in the following description.

Referring to the accompanying drawings, in which like numerals of reference indicate the same parts throughout the several views,

Figure 1 is a perspective view of a press embodying my invention;

Fig. 2 is a side elevation of my improved pitman, in normal position, the crank and slide or ram at its opposite ends being in section;

Fig. 3 is a similar view showing the hinged parts of the pitman after yielding as they would under excessive pressure;

Fig. 4 is a detail central section through the pitman, taken upon a vertical plane from front to rear of the press, showing the re-

lation of the pitman sections to their pivotal pins;

Fig. 5 is a front view of a portion of the press with the pitman and its hinge joints in section;

Fig. 6 is a cross-section on line 6—6 of Fig. 5;

Fig. 7 is a cross-section on line 7—7 of Fig. 5;

Fig. 8 is a perspective view of a certain adjusting nut;

Figs. 9 and 10 are vertical sectional views corresponding to Figs. 2 and 3 showing a modified construction with the parts in normal and yielded positions respectively, and

Figs. 11 and 12 are similar sectional views of another modification of construction.

In the specific embodiment of the invention shown in said drawings, 1 indicates the frame of a press having a pitman 2 connected to a slide or ram 3 adapted to work up and down in slideways 4 and being actuated from a crank shaft 5 in the upper part of the press frame, said crank shaft being shown as driven through a gear wheel 6 meshing with a pinion 7 on a driving shaft 8, provided at the opposite side of the press with a fly wheel 9 and belt pulleys 10. It is to the means connecting said slide or ram 3 to the crank shaft 5 that my present invention more particularly relates, and the improvement which I have invented consists in constructing said connecting means so that it will yield laterally, or "break," in event of the pressure exceeding a predetermined limit. The slide and crank shaft may be of any suitable and well-known construction, my improved pressure limiting means being contained entirely in the pitman or connecting rod extending between said crank shaft and slide or ram.

In carrying out my invention, I form said pitman or connecting rod in sections 11 and 12 which are connected at their ends away from each other to the crank shaft and slide and at their adjacent ends are hinged together as will be described more fully herein. These sections 11 and 12 have at their adjacent pivoted ends and in the plane of said pivoting, which is a plane perpendicular to the crank shaft, extensions or arms 13, 14 which are substantially parallel and adapted to be contiguous when the pitman sections are in normal aligned position, as shown in Fig. 2. Spring means are pro-

vided to hold the arms 13, 14 in abutment and the pitman sections in normal position as stated, and the form of such spring means may vary widely without departing from the spirit and scope of my broad invention. I have shown in Figs. 2 and 3 a rod 15 passing through said arms 13, 14 perpendicular thereto and provided on the outer opposite sides of the arms with helical springs 16, 17 which seat against stops at the opposite ends of the rod. The springs are tensioned so as to hold the arms together and the pitman sections in alinement until a certain pressure limit is reached when they will yield and allow the arms to separate and the pitman sections to swing upon their pivotal connection, or "break," as shown in Fig. 3.

By my improved construction the springs act, after the pitman sections have "broken" or yielded, as shown in Fig. 3, to return the same to initial position, and thus not only do the pitman sections return into alinement as soon as the excess pressure is relieved, but furthermore, they always exert pressure, even after the pitman sections have yielded or "broken," to resist further separation. Also the further the arms separate the more the springs are compressed and thus the greater is the pressure tending to resist further separation and to restore the arms to initial position.

It will be noted from Fig. 2 that the centers of the hinge connection of the pitman sections and the pivotal connection of the pitman to the slide or ram are off-set or displaced laterally to opposite sides of a vertical line through the center of the crank shaft, and thus the pitman sections "break" or yield hingedly with an initial pressure which is not greatly in excess of the pressure required to force the arms 13 and 14 apart against the power of the springs 16 and 17. Furthermore, the arms 13, 14 project from the pitman in the direction toward which the crank shaft 5 moves at the lower portion of its circular path, indicated by the arrow in Fig. 3, so that the turning friction of the crank shaft upon the pitman, and which is obviously greatest when the pressure is near the limit, is taken advantage of to "break" the pitman. By these means the initial pressure required to open the pitman sections is not so greatly in excess of that required to compress the springs which normally hold the arms 13, 14 together, and thus the device works easily and gradually.

Obviously, instead of the two springs shown in Figs. 2 and 3 I could employ only one, with a tension or strength equal to the two, the rod being loosely connected to the springless arm in any suitable manner. In Figs. 9 and 10 I have shown arms 18 and 19 near the opposite ends of the pitman sections, with a helical spring 20 between their outer

ends and connected thereto, so that when the pitman is "broken" the said spring is elongated, as shown in Fig. 10. At other times it holds the pitman sections in alinement, as shown in Fig. 9, stops 21, 22 being provided to limit the action of the spring. In Figs. 11 and 12 a yoke 23 is mounted upon the pivotal connection of the pitman sections, and against the outer middle portion of this yoke bears one end of a spring 24, the other end of which bears against a plate 25 which is connected by links 26, 26 to the pitman sections near their ends away from each other. Obviously by this construction "breaking" of the pitman compresses the spring 24, as shown in Fig. 12, so that under normal pressure it holds the pitman sections in alinement, as shown in Fig. 11. Various other constructions of spring means for holding the pitman sections normally in alinement may be employed, as desired, without departing from my invention.

In order to take up any looseness which may arise in the pivotal connections of the pitman sections to each other and of the pitman to the slide or ram, I have provided both of said joints with adjusting means, which are substantially alike for both of them so that only one need be described in detail. Taking the one at the lower end of the pitman, where it is pivoted to the slide, it will be understood that the pressure is borne by the central portions of the end of the pitman and the slide, a pivot pin 27 lying between said portions and receiving the pressure, since the said parts are cut away at the opposite sides of the pin as shown in Fig. 4, more particularly. For connecting the pitman to the slide so that the latter will be raised with the pitman, the pitman has at its lower end ears 28, 28, which overlap downward at the sides of the slide and the slide has ears 29, 29 which extend upward between said ears of the pitman. The pivot pin 27 is keyed to one of said ears 29 of the slide so that it cannot turn, and said pivot pin has eccentrically reduced ends 30, 30 receiving eccentric sleeves 31, 31 which fit within the ears 28 of the pitman. Obviously when wear causes any looseness between the pitman and slide upon the upper side of the pivot pin, turning said eccentric sleeves 31, 31 in unison will shift the pivot pin upon the pitman taking up such looseness and merely sliding the slide or ram upward with respect to the pitman and its ears 28. In order to move the eccentric sleeves in unison they have radial arms 32 with arcuate slots 33 at their outer ends which receive a bolt extending through said slots and a hinge member 34 of the slide or ram, against the ends of which member the eccentric sleeve arms may be clamped by nuts 35, 35 on the bolt.

As stated, the adjusting means for the joint between the pitman sections is similar to the one just described, a pivot pin 36 lying between the two sections and receiving ears 37, 37 on the lower section which project upward between ears 38, 38 on the upper section. It is not necessary at this joint to cut away the ends of the pitman sections on both sides of the pivot pin, as at the lower joint, because pivotal action occurs only in one direction, namely that in which the pitman "breaks". The ends of the sections are therefore cut away at the other side of the pivot pin, for their central portions, as shown in Fig. 4. The pivot pin is keyed to the lower section as at 39 and its reduced ends 40, 40 receive eccentric sleeves 41, 41 which fit within the ears 38, 38. These eccentric sleeves have radial arms 42, with arcuate slots 43 at their outer ends which receive a bolt 44 extending through said slots and the lower pitman section so that the arms may be clamped by nuts 45 on the ends of said bolt.

Of course in use of the press it is necessary to adjust the slide or ram with respect to the pitman, and to provide for this I have shown the upper part of the slide having a bushing 46 which receives the stem of the hinge member 34 at the bottom of the pitman so that by turning said sleeve the slide or ram can be moved toward or away from the pitman without turning either said slide or pitman. Preferably the said bushing 46 is threaded exteriorly to fit a socket 47 in the slide or ram and threaded interiorly to fit the stem 48 of the pitman hinge member, the inner and outer threads of the bushing differing so as to produce a differential screw, preferably one which will permit fine and accurate adjustment. To this end, the internal and external threads may be of different kind, that is, one right hand and the other left hand, or they may be only of different pitch, or they may differ in both kind and pitch, as desired. The upper end 49 of the bushing is provided with suitable means for turning it, such as the sockets 50 to receive a spanner wrench or the like, and there are also provided means for locking the sleeve against any rotary movement after the parts are properly adjusted. I have provided such locking means by splitting the bushing 46 longitudinally and making its socket in the slide or ram in two parts, as shown in Fig. 7, the movable part 51 being adapted to be clamped toward the fixed part by clamping screws 52, 52 or the like. Thus when the desired adjustment has been secured, said movable side portion 51 is clamped firmly against the split bushing 46, closing the same upon the stem 48 and locking all said parts against any relative movement.

The head 53 of the hinge member 34, it

will be understood, has the ears 29, 29 which connect to the pitman, and said head at its rear side is adapted to fit against the back wall of the slide or ram, as at 54 in Fig. 6 more especially. This supports the hinge member against lateral strain, and more particularly against the lateral strain which occurs when the pitman is approaching its lower vertical position, at the end of the down stroke. It is this back 55 of the slide or ram which forms at its opposite edges the slides 56, 56 on which the ram moves up and down, and said back being extended upward as shown in the drawings both the ram and the connection of the pitman to the same are well adapted to resist the lateral strain which occurs as above stated.

In order to prevent the hinge member 34 of the slide or ram from any tendency to turn when the bushing 46 is adjusted, said rear side of the hinge member which bears against the back 55 of the slide or ram is provided with a tongue 57 which travels in a vertical groove 58 of said back, see Figs. 3, 4 and 6.

Obviously detail modifications and changes may be made in manufacturing my improved power press without departing from the spirit and scope of the invention, and I do not wish to be understood as restricting myself except as required by the following claims when construed in the light of the prior art.

Having thus described the invention, what I claim is:

1. The combination of a pitman comprising sections hinged together, arms on the hinged ends of said sections projecting adjacent each other, a rod extending slidably through said arms and secured against withdrawal, and compression springs one between each arm and the end of the rod.

2. In a power press or the like, a crank, a pitman comprising sections hinged together, arms on the hinged ends of said sections projecting adjacent each other in the direction of movement of the crank at the end of a working stroke, a rod extending slidably through said arms, and compression springs on said rod outside the arms.

3. In a power press or the like, a crank, a pitman comprising sections hinged together, arms on said sections projecting laterally therefrom in the direction of movement of the crank at the completion of a working stroke, and means on said arms resiliently resisting separation of them and tending to return them to initial relation when separated.

4. In a power press or the like, a crank, a pitman comprising sections hinged together to bend in the direction of movement of the crank at the end of a working stroke, and means upon said sections and carried thereby for resiliently resisting bending of the

sections and tending to restore them to initial position when bent.

- 5 In a power press or the like, the combination with a crank, of members adapted to be reciprocated thereby, a hinge pin between the adjacent ends of said members holding their central portions out of engagement with each other, overlapping ears on said members at opposite ends of the hinge pin, said ends being reduced eccentrically, and eccentric sleeves on said reduced ends in said ears, whereby wear between the members and hinge pin may be taken up by turning said sleeves.
- 10 6. In a power press or the like, the combination with a crank, of members adapted to be reciprocated thereby, a hinge pin between the adjacent ends of said members holding their central portions out of engagement with each other, overlapping ears on said members at opposite ends of the hinge pin, said ends being reduced eccentrically, and eccentric sleeves on said reduced ends in said ears, and means for locking said sleeves.
- 15 7. In a power press or the like, the combination of a crank, a pitman comprising hinged sections adapted to yield under excessive pressure, a slide or ram hinged to said pitman, a hinge pin between the adjacent ends of the members of one of said pairs of hinged members holding their central portions out of engagement with each other, overlapping ears on the members of said pair at opposite ends of the hinge pin, said ends being reduced eccentrically, and eccentric sleeves on said reduced ends in the ears of one member.
- 20 8. In a power press or the like, the combination of a crank, a pitman comprising hinged sections adapted to yield under excessive pressure, a slide or ram hinged to said pitman, hinge pins between the adjacent ends of the members of each of said pairs of hinge members holding their central portions out of engagement with each other, overlapping ears for each pair of members at opposite ends of their hinge pin, said ends being reduced eccentrically, and eccentric sleeves on the reduced ends of each hinge pin in the ears of one member.
- 25 9. In a power press or the like, the combination of a crank, a pitman, a slide or ram, a hinge pin between the adjacent ends of said pitman and slide or ram holding their central portions out of engagement with each other, overlapping ears on said members at opposite ends of the hinge pin, said ends being reduced eccentrically in the ears of one member, and eccentric sleeves on said reduced ends.
- 30 10. In a power press or the like, the combination of a crank, members adapted to be reciprocated by said crank, a hinge pin between the adjacent ends of said members holding their central portions out of en-

gagement with each other and being rotatably fast with respect to one of them, overlapping ears on said members at opposite ends of the hinge pin, said ends being reduced eccentrically in the ears of one member, and eccentric sleeves on said reduced ends.

11. In a power press or the like, the combination with a crank, a pitman comprising hinged sections adapted to yield under excessive pressure, a slide or ram for said pitman, a hinge pin between the adjacent ends of the members of one of said pairs of hinge members holding their central portions out of engagement with each other and rotatably fast with respect to one of the members, overlapping ears on the members of said pair at opposite ends of the hinge pin, said ends being reduced eccentrically of one member, and eccentric sleeves on said reduced ends.

12. In a power press or the like, the combination of a crank, a pitman, a slide or ram, a hinge pin between the adjacent ends of said pitman and slide or ram holding their central portions out of engagement with each other and being fast with respect to one of them, overlapping ears on said members at opposite ends of the hinge pin, said ends being reduced eccentrically in the ears of the pitman, and eccentric sleeves on said reduced ends.

13. In a power press or the like, a pitman, a slide or ram having a socket, a hinge member at the end of said pitman with a threaded stem extending into said socket, and a sleeve on said stem in said socket threaded interiorly and exteriorly to engage the same and move them longitudinally with respect to each other when the sleeve is rotated.

14. In a power press or the like, a pitman, a slide or ram having a socket, a hinge member at the end of said pitman with a threaded stem extending into said socket, a sleeve on said stem in said socket threaded interiorly and exteriorly to engage the same and move them longitudinally with respect to each other when the sleeve is rotated, and means for locking said sleeve against movement.

15. In a power press or the like, a pitman, a slide or ram having a socket with part of its lateral wall movable, a hinge member at the end of said pitman with a threaded stem extending into said socket, a sleeve on said stem in said socket threaded interiorly and exteriorly to engage the same and move them longitudinally with respect to each other when the sleeve is rotated, and means for clamping said movable part of the socket wall against said sleeve.

16. In a power press or the like, a pitman, a slide or ram having a socket, a hinge member at the end of said pitman with a

threaded stem extending into said socket, a split sleeve on said stem in said socket threaded interiorly and exteriorly to engage the same and move them longitudinally with respect to each other when the sleeve is rotated, and means for clamping said split sleeve.

17. In a power press or the like, a pitman, a slide or ram having a socket with part of its lateral wall movable, a hinge member at the end of said pitman with a threaded stem extending into said socket, a split sleeve on said stem in said socket threaded interiorly and exteriorly to engage the same and move them longitudinally with respect to each other when the sleeve is rotated, and means for clamping said movable part of the socket wall against said sleeve.

18. In a power press or the like, a pitman, a slide or ram having an upward extension at its back or side opposite that from which the pitman is brought into vertical position at the end of its working

stroke, and a member connecting the end of the pitman adjustably to the slide or ram and having a bearing against said upward extension of the same, whereby the strain upon said member in bringing the pitman into vertical position is resisted.

19. In a power press or the like, a pitman, a slide or ram having an upwardly extending guideway at its back or side opposite that from which the pitman is brought into vertical position at the end of its working stroke, and a member connecting the end of the pitman adjustably to the slide or ram and engaging said guideway to laterally support it against the strain in bringing the pitman into vertical position.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EDMUND W. ZEH.

Witnesses:

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