Dec. 9, 1930. A. BREDENBERG 1,784,721

PRESS FOR OPERATING UPON SHEET MATERIAL

Filed March 8, 1928 2 Sheets-Sheet 1

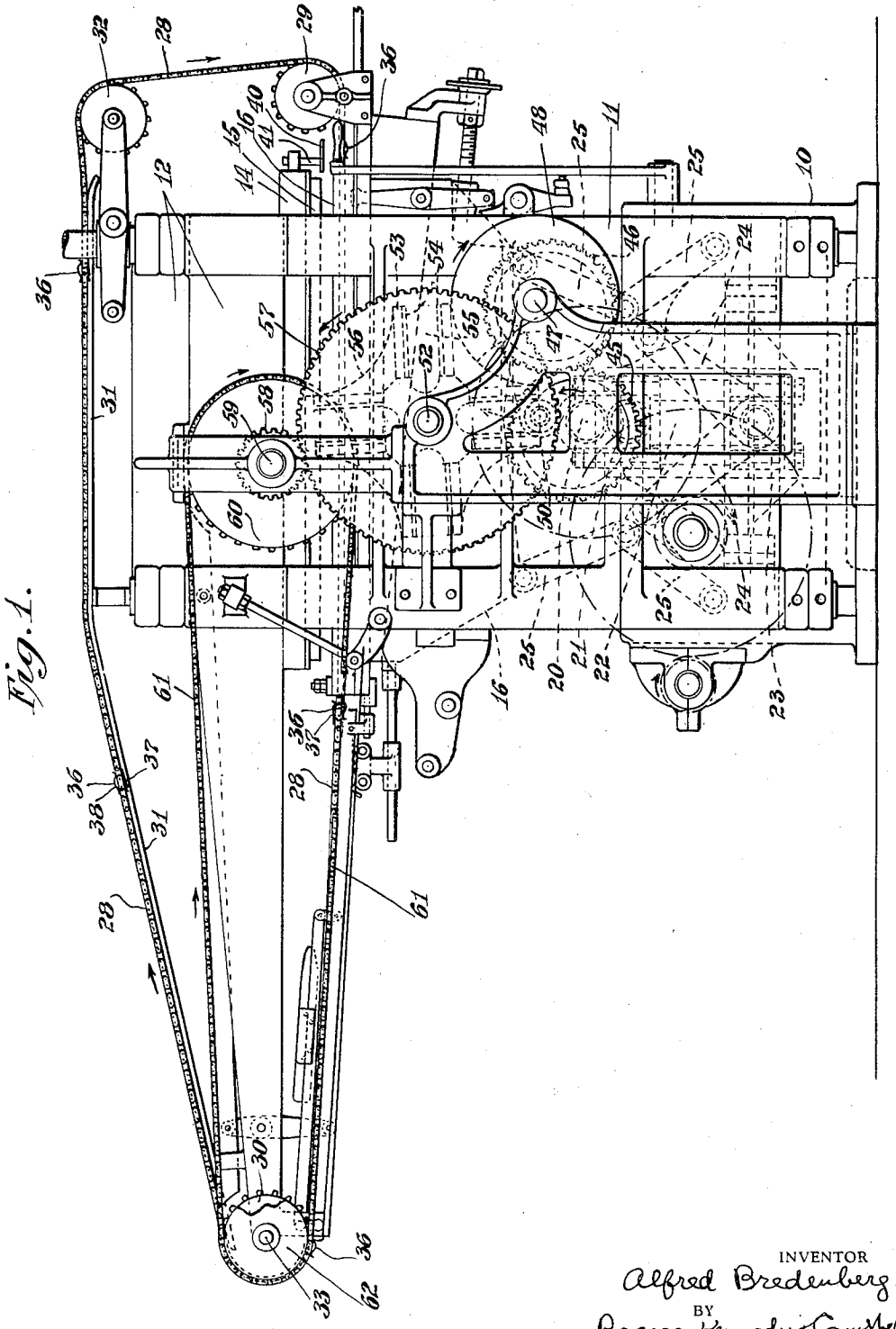


Fig. 1.

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Fig. 3.

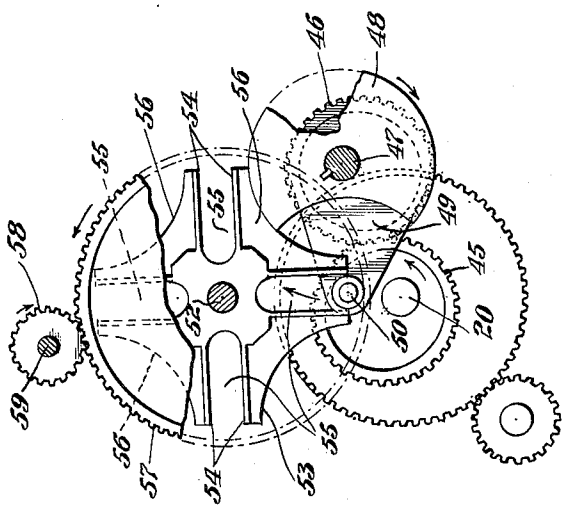


Fig. 4.

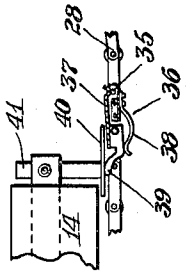
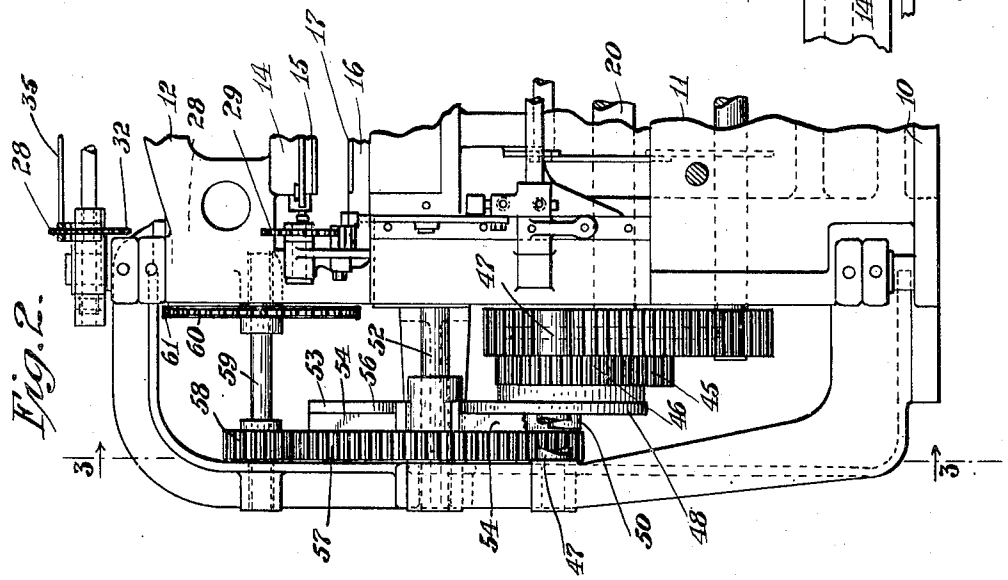


Fig. 2.



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UNITED STATES PATENT OFFICE

ALFRED BREDENBERG, OF CHAMPLAIN, NEW YORK, ASSIGNOR OF ONE-HALF TO THE SHERIDAN IRON WORKS, OF CHAMPLAIN, NEW YORK, A CORPORATION OF NEW YORK, AND ONE-HALF TO T. W. & C. B. SHERIDAN COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

PRESS FOR OPERATING UPON SHEET MATERIAL

Application filed March 8, 1928. Serial No. 260,186.

This invention is a novel press for operating upon sheet material, and refers more particularly to the class of press for applying operating pressure upon successive portions of material, such as leather or cardboard, namely, for embossing, plating, cutting, punching, or performing other press operations upon the sheet material.

The features of invention are shown illustratively applied to a power operated press of the Sheridan type, comprising opposite, or upper and lower, platens moved one toward the other for the cutting, embossing or other operation, and separated from each other to permit the feed, shift, or removal of the work or sheet material, together with automatic work feeding or shifting means operating to advance the sheet material between the platens during that portion of the cycle of operations wherein the platens are separated. This class and type of press is typically illustrated by my prior Patent No. 1,053,566 of February 18, 1913, wherein embossing or flat plating operations are performed. While in some cases the sheet material might be in continuous web or strip form, or carried along between press operations by means of a continuous web or strip, the invention herein is shown applied to a press wherein separate pieces of sheet material are fed successively and intermittently from an infeed point to operating position and therefrom to an outfeed point. The supply or infeed of sheets of material to the machine may be by hand or any automatic infeed mechanism, and for simplicity the disclosed embodiment employs the hand supplying or infeeding system, analogous to my said Patent 1,053,566.

The relative approach and recession of the press members or operating platens may be effected from the main power shaft or other source of power in any desired manner, for example by the employment of toggle mechanism arranged to elevate the lower platen or bed, analogously to my said Patent 1,053,566, or to my expired Patent 821,079 of May 20, 1906, or hydraulically or otherwise. It will be understood that in the case of an embossing or flat plating press the toggle or other pressing connections will be arranged and operated to maintain high pressure upon the work for a substantial period of time or portion of the entire cycle of operations; whereas with a cutting out press as herein illustratively shown there is no need for continued pressure, and the lifting of the pressing bed is herein followed by its immediate lowering.

Along with the elements thus generally referred to is combined a work feeding or conveying means or device, which may be referred to as the work carrier, arranged to advance each portion or piece of sheet material into operating position and subsequently advance it further to remove it from position, while bringing a new portion into position. This may, as in said Patent 1,053,566, comprise an endless feeder or carrier, as a pair of traveling chains advancing in unison at the two sides of the machine and carrying a series of spaced holding means for gripping successive pieces of sheet material. Such work carrier is intermittent in operation, pausing to leave the work stationary during the pressing operation, and advancing between operations while the platens are separated. The so-called Geneva stop motion is a known advantageous means of producing intermittent advancing movements of an element with relative ease of action; thus my Patent 1,347,492 shows a special form of Geneva mechanism operating upon the book carrier of a bookbinding or covering machine. Despite the advantages of the Geneva intermittent motion it is found to impose an undue limitation on the speed and output of a press by reason of the inherent limitations of the ordinary Geneva mechanism. Other motions have been tried; thus in Patent 1,053,566 the press is shown as having the work carrier chains advanced intermittently by means of a toothed sector. This however is also found not to be capable of the high speed of output desirable for modern production.

The general object of the present invention therefore is to afford a press wherein the carrier for the automatic feed of the work may be advanced in a smooth, easy and quiet manner, yet such as to permit substantially great-

er speed of operation and output than in the fastest presses of the same class already known. A particular object is to afford a particular combination employing the underlying principles of the Geneva type of intermittent feed but not having the speed limitation of the usual or known arrangements. Other and further objects and advantages of the invention will be elucidated in the hereinafter following description of an embodiment thereof or will be understood to those conversant with the subject matter.

To the attainment of such objects and advantages the present invention consists in the novel press, and the novel features of operation, combination, arrangement and mechanism herein illustrated or described.

In the accompanying drawings Fig. 1 may be considered a left side elevation of a power press embodying the present invention, the front side of the press being at the right end of this figure, where the operative may attend to the infeeding of successive sheets to the work carrier.

Fig. 2 is a partial front view of the press showing particularly the left end thereof with the gearing concerned particularly in the present invention.

Fig. 3 is a more or less diagrammatic left elevation of certain parts detached, taken partly in section substantially on the line 3—3 of Fig. 2.

Fig. 4 is a detached and enlarged left elevation of a detail, namely one of the work feeding grippers.

The invention may be described in one aspect as consisting of a power press for cutting, embossing or performing other pressing operations upon cardboard, leather or other sheet material, the same comprising the opposite press members or platens, the power shaft, and connections for causing one of the press members to move toward and from the other in each cycle, in combination with a work feeding carrier of any type adapted to advance successive portions of the sheet material into or from operating position between the press members, an intermittent drive device of the Geneva or crank and star type, or other type giving analogous easy motion, for causing the feed or advance of the carrier and work between pressing operations, and finally a transmitting means between the power shaft and the intermittent drive device such as to deliver relatively high speed to the device during the pressing period or portion of the cycle and a low speed during the feeding period; this final element consisting specifically of a fast and slow transmitter, such as elliptical gearing, between the power shaft and the intermittent drive, timed to turn the crank member thereof at slow speed while engaged with the star member and at fast speed when disengaged therefrom.

Referring first to the left and front elevations of Figs. 1 and 2, the machine is seen to comprise a base 10 supporting a frame 11 which comprises uprights that are interconnected at the top of the machine by a beam 12, these frame elements being substantially as ordinarily constructed in this class of press, of heavy, strong and rigid structure. The pressing members of the press comprise a top platen or press member 14, the lower part 15 of which contacts the material during pressure, and a lower platen or press member 16, this being preferably the movable member, and having at its upper side a pressing portion or bed 17 of any desired character. The drawings show a number of adjuncts, commonly used in this type of press, but which have no particular relation to the features of invention hereof and will not be described.

The connections for effecting the operative pressure between the platens, preferably by raising the lower press member or bed, are power operated, the power being derived from what may be termed the power shaft 20, from which the several motions of the machine take their action, and which in turn may derive its power from any desired source, as an electric motor and reduction gearing.

The pressing connections from the power shaft 20 may be of the toggle type. Such connections are well known and are sufficiently illustrated by the dotted lines in Fig. 1. On the power shaft are one or more cranks 21 each connected by a rod or pitman 22 with a crosshead 23 arranged to move upwardly and downwardly and shown in its lowest position. Each crosshead directly operates a horizontal toggle comprising a pair of links 24 extending from the crosshead forwardly and rearwardly each to a vertical toggle. There are thus at least four pairs of vertical toggles each comprising a pair of links 25, the lower of which may have a fixed fulcrum while the upper link of each pair is shown fulcrumed directly to the rising and falling lower press member 16.

The work feeding carrier is preferably an endless device in the nature of one or more traveling bands or sprocket chains 28, for example an opposite pair of these, arranged to advance in unison through the pressing position and carrying spaced devices for holding and carrying successive pieces of material. Thus each of the two chains 28 is shown as passing around a front sprocket 29, and thence traveling rearwardly between the two press members, and at the extreme rear around a guiding sprocket 30, thence upwardly at an incline, supported on a bar or guide 31, which is continued horizontally substantially to an upper front sprocket wheel 32 over which the chain passes on its way to the first mentioned sprocket wheel 29. The two opposite carrier or sprocket chains turn in unison by reason of their

sprocket wheels 30 being mounted on a common shaft 33, which is revolved intermittently as will be described. The work holding or gripping means may comprise a plurality of spaced crossbars 35, each carrying a plurality of grippers 36, five sets of grippers being shown around the periphery of the chains 28. These gripper devices may be of any desired character, for example substantially on the principles of my said Patent 1,053,566, and as indicated separately in Fig. 4 hereof, the actual gripping fingers or plates 37 are pressed into gripping position by springs 38 but are adapted to be opened by the upward movement of the press bed carrying the gripper tail 39 against a fixed plate 40 carried at the lower end of a rod 41 adjustably mounted on the upper press member or platen 14. From Fig. 1 it will be understood that when the bed is raised to press one piece of material the next succeeding gripper 36 is opened by contact with the plate 40 at the front of the machine, thereby permitting the next piece of material to be fed into gripping position, the gripper closing as the bed descends so that the material is gripped properly for feeding forward into pressing position in the next cycle, namely between the cross bar 35 and grip finger 37.

The complete connections from the power shaft 20 to the work feeding carrier will first be described and then the operation thereof. The feeding and pressing operations are coordinated because both taken from the power shaft, the connections for lifting the pressing bed having already been described, one complete rotation of the power shaft constitutiog a complete cycle, the bed rising for the pressing action and descending to initial position. The feeding connections commence with the fast and slow transmitting device followed by the intermittent or Geneva drive device and then the further connections to the feeding carrier. The mechanical arrangement may be as follows.

On the power shaft 20 is shown an elliptical gear 45 which engages with a complementary elliptical gear 46 on a counter shaft 47 which may also be the drive shaft of the Geneva motion. These elliptical gears of course give alternately fast and slow speed to the drive shaft 47, in coordination with the action of the Geneva motion. The drive shaft 47 is shown as carrying a locking disk 48, analogous to the usual recessed disk of a Geneva motion, serving to lock the driven elements against accidental motion when not being driven. The driven shaft 47 also carries a crank arm or disk 49 supporting a crank or pin 50 which is the crank member of the Geneva motion, the fast and slow gearing being arranged to turn this crank at slower speed while engaged with the driven or star member of the Geneva motion and at faster speed when disengaged therefrom.

The driven portion of the Geneva motion is mounted on the intermittently driven shaft 52, which carries the star wheel or member 53 which is formed with radial arms 54 constituting guides for the crank member 50. The minimum practical number of points or radial guides is shown, namely four, and each of these guides is shown specifically as enclosing a slot or slideway 55 in which the crank or pin 50 may travel radially inwardly and outwardly during that part of the cycle in which the drive elements operate to turn the driven elements through a quadrant of rotation. Between each two radii or points of the star wheel are shown webs 56 of concave or arc shape complementary to the circular contour of the locking disk 48, and in Fig. 3 the locking disk is shown about to disengage one of these arc webs 56 as the crank pin 50 commences its operative engagement with the star wheel.

The Geneva driven shaft 52 therefore turns with intermittent motion, the actual period of motion being prolonged by the fast and slow gearing and the period of rest being shortened or minimized. This action may be transmitted to the work feeding carrier as follows. On the driven shaft 52 is shown a toothed gear 57 and this engages a pinion 58 on a counter shaft 59 at the upper part of the machine. This shaft 59 at another point carries a sprocket wheel 60 which drives a sprocket chain 61 extending rearwardly to a sprocket wheel 62 fixed on the same shaft 33 which carries the sprocket wheels 30 that drive the two carrier chains 28.

The operation and advantages may be explained as follows. With the ordinary type of Geneva intermittent drive the driving or crank member is rotated at a uniform speed by its shaft and operates to rotate the driven or star member at a varying angular speed commencing with zero and terminating with zero, with a maximum speed when the crank pin is in alinement with the two axes. The inherent result is, with a four point star wheel, that the latter will be in motion during a quadrant or about 90° of rotation of the driver, this motion therefore occupying 25% of the complete cycle of the machine, and with a five or six point wheel the fraction would be yet smaller. The starting up of the work carrier, its acceleration to its maximum speed and its slowing down and stoppage, with a quite extended length of travel, must therefore be performed within at most 25% of the entire cycle. This gives satisfactory and smooth drive for low speed presses, but notwithstanding the advantages of the Geneva mechanism the speed changes are prohibitive, injurious to the mechanism, and noisy at high speeds. The essence of the present invention is the prolonging or drawing out of the percentage or portion of the entire cycle occupied by the actuation of the

work carrier, thus apportioning the cycle to more effective advantage between the pressing and feeding actions. This can not be done by substituting a three point for a four point star wheel as the Geneva mechanism is not practical with less than four tracks or slots. The principles of the present invention might be employed to reapportion the cycle with a five point star wheel, but its most favorable results are obtained by use with the four point wheel.

The present invention operates by giving to the driver or crank member a varying speed, namely fast and slow, and utilizing the slow portion of its rotation for the actuation of the star wheel, so that the period of such actuation will be materially prolonged, the crank member rotating at its maximum speed when out of engagement with the star member, thus shortening the pauses between drives.

While the fast and slow rotation of the crank member may be effected by different fast and slow transmitting gears a convenient and smooth operating means for this purpose consists in elliptical gearing. If now we assume that the long and short radii of the elliptical gears are in the proportion of two to one, and that power shaft 20 turns 12 revolutions per minute, it follows that the intermediate shaft 47 will make a complete turn in 5 seconds, at a mean speed of 12 rotations per minute, but with a maximum speed of 24 per minute at one part of the cycle and a minimum of 6 per minute at another part of the cycle. The crank and star members are so arranged that when the pin is at its minimum speed it is in driving engagement with the star member, and in alinement with the two axes, thus driving the star member at the maximum speed of the latter, whereas when the crank member is at its maximum speed it is at the opposite point and inoperative. From the time that the crank pin engages each slot of the star wheel until it leaves the same slot it occupies a quarter rotation of the star wheel and delivers one step of intermittent travel to the work carrier, but this actuation occupies a greater period of time than a quarter of the entire cycle, due to the fact that the pin is moving through the slower part of its orbit while effecting the actuation.

Since the minimum angular speed of the crank pin is in the neighborhood of only half of its mean speed it follows that the maximum speed of the star wheel is materially reduced as compared with an ordinary Geneva mechanism.

The practical result therefore is that there is a substantial reduction of the maximum speed of work feed, and a prolongation of the period of work feed, in this case from 25% to as high as 33% or higher, without sacrificing but enhancing the ease and smoothness of engagement, drive and disengagement of the Geneva mechanism. It is found that, in a machine of the class and type described, when equipped with this invention, the practical speed of operation may be increased about 50%, thus enabling two machines to give the output which formerly required three. Where as high as fourteen operations per minute have been obtainable the present invention permits a speed of twenty per minute.

There has thus been described a press for operating upon sheet material embodying the features and attaining the objects of the present invention. Since many matters of operation, combination, arrangement and mechanism may be variously modified without departing from the principles of the invention it is not intended to limit the invention to such matters except so far as set forth in the appended claims.

What is claimed is:

1. In a power operated platen press for performing pressing operations upon leather, cardboard or analogous sheet material, of the class wherein is a work feeding carrier for advancing successive portions of the sheet material between the opposing press members and an automatic mechanism for actuating such work feeding carrier; such actuating mechanism comprising in combination, a crank member, and a star member driven thereby, said members constituting an intermittent drive device and having connections from the star member for shifting the carrier and work between pressing operations, together with a fast-and-slow transmitting gear taking its motion from the same power source as the pressing operation and connected to drive said crank member and timed to advance the latter at the slow speed while engaged with the star member and at the fast speed while disengaged therefrom, whereby the carrier shifting and work advancing period of each cycle is relatively prolonged and the period of rest shortened.

2. In a power operated platen press for performing pressing operations upon leather, cardboard or analogous sheet material, of the class wherein is a work feeding carrier for advancing successive portions of the sheet material between the opposing press members and an automatic mechanism for actuating such work feeding carrier; such actuating mechanism comprising in combination, a crank member, and a star member driven thereby, said members constituting an intermittent drive device and having connections from the star member for shifting the carrier and work between pressing operations, together with a fast-and-slow transmitting gear taking its motion from the same power source as the pressing operation and connected and timed to drive said crank member at the slow speed while engaged with and driving the star member during the feeding

period and at the fast speed while disengaged from the star member during the pressing period.

3. In a power operated platen press for performing pressing operations upon leather, cardboard or analogous sheet material, of the class wherein is a work feeding carrier for advancing successive portions of the sheet material between the opposing press members and an automatic mechanism for actuating such work feeding carrier; such actuating mechanism comprising in combination, a crank and a four-point star wheel driven thereby constituting an intermittent drive device and having connections from the star wheel for shifting the carrier and work, together with a fast-and-slow transmitting gear taking its motion from the power source and connected to drive said crank and timed to advance the latter between pressing operations at the slow speed while the crank engaged with and driving the star wheel and during pressing operations at the fast speed while disengaged from the star wheel; whereby the carrier shifting and work advancing portion of each cycle is relatively prolonged and the period of rest shortened.

In testimony whereof, I have affixed my signature hereto.

ALFRED BREDENBERG.