April 2, 1963 H. P. EBERHARDT 3,083,559

SPLITTING MACHINES

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Fig. 1

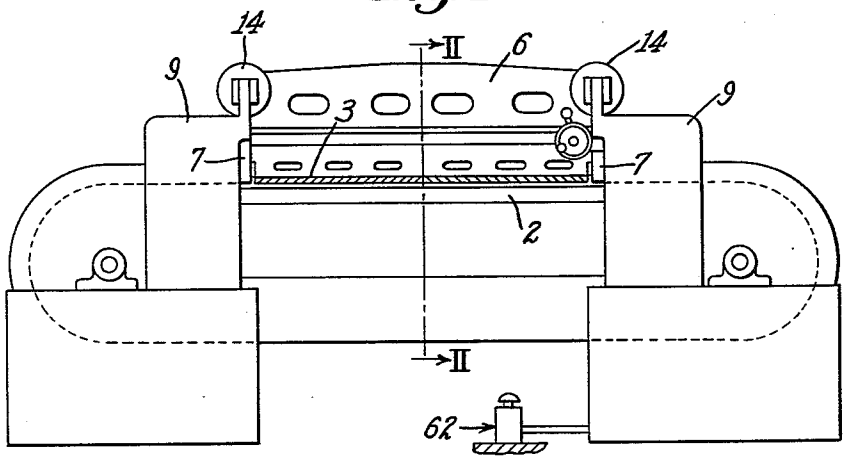
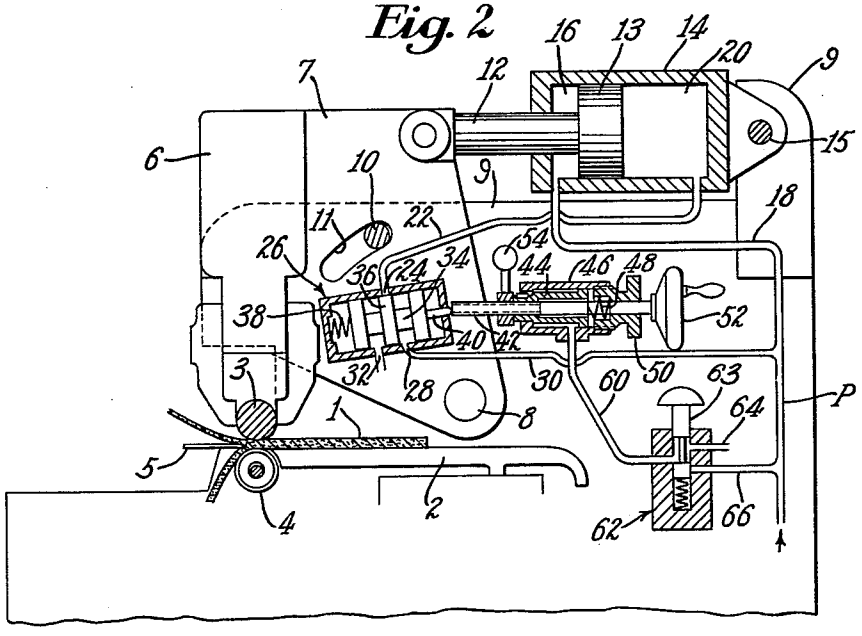


Fig. 2



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Fig. 3

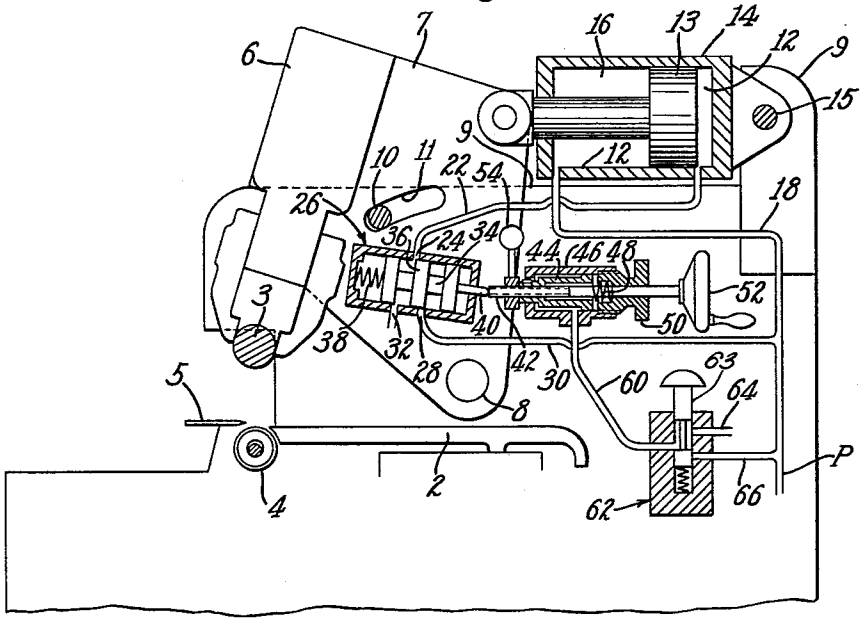
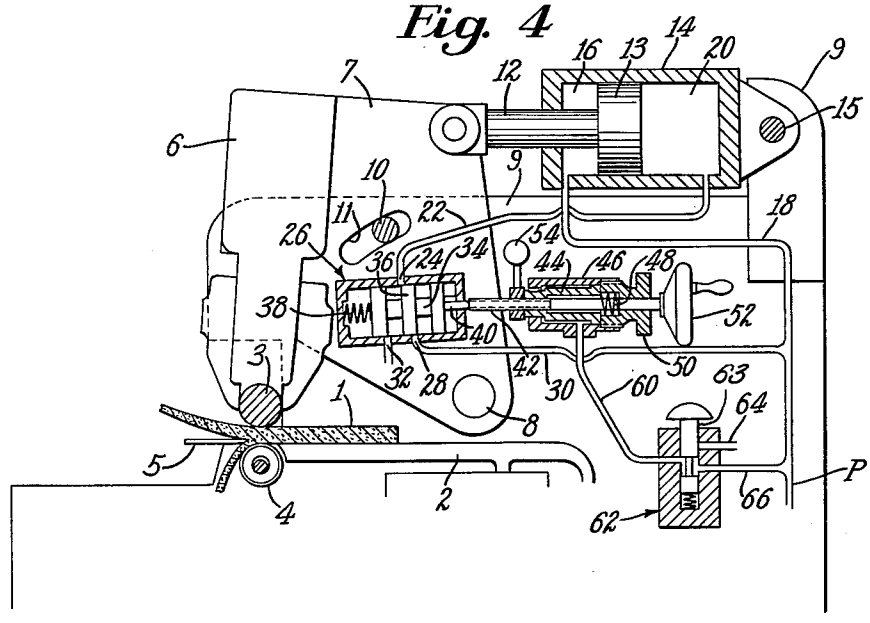


Fig. 4



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SPLITTING MACHINES

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3 Claims. (Cl. 69—10)

This invention relates to a machine for splitting sheet material, such as hides, leather, rubber and the like. More particularly, the invention is directed to a device for controlling the position of the gaging head of a belt knife splitting machine for determining the thickness of the split being made.

Machines of this type usually include a belt knife having a cutting edge against which the material to be split is fed by means of feed rolls. One of the feed rolls acts as a gage roll and is spaced from the cutting plane of the knife a distance equal to the desired thickness of the material to be split. The position of the gage roll should be capable of simple adjustment within wide limits according to the desired thickness of the split and after adjustment must be maintained rigidly in place while working under heavy pressure.

However, splitting machines capable of operating on large work pieces usually are of heavy construction for rigidity and for purposes of adjustment the gage roll usually is mounted at opposite ends in heavy vertically movable slides which are raised or lowered by screw spindles or other heavy mechanical means. While such construction is rigid it does not lend itself to easy or quick adjustment.

Accordingly, it is a general object of the invention to provide means for adjusting the position of the gage roll of a splitting machine in a simple and easy manner without sacrificing rigidity. To this end the head carrying the gage roll is mounted for swinging movements about pivots substantially in the same horizontal plane as the gage roll. To provide rigidity while at the same time permitting simple adjustment, the head mounting the gage roll is raised and lowered by a pair of double acting hydraulic cylinders which are controlled precisely by an easily adjustable hydraulic feeler mechanism.

When operating on heavy hides it is often desirable to increase the thickness of the split especially in the neck portion since this portion is rather spongy and tends to collapse more in succeeding tannage operations than the remainder of the hide. In machines heretofore available variation in thickness on a single work piece was not usually possible since the cumbersome gage roll adjustment mechanism simply did not permit quick and accurate adjustment during a splitting operation. Accordingly, one feature of the invention provides quick and accurate adjustment of the gage roll by a simple manual actuation of a valve by the operator at any time during a splitting operation.

The above and other features of the invention including various details of construction and novel combinations of parts will now be described with reference to the drawings and thereafter distinctly pointed out in the claims.

In the drawings,

FIG. 1 is an elevation of a belt knife splitting machine embodying the present invention;

FIG. 2 is a section generally on line II—II of FIG. 1 but shown in diagrammatic fashion;

FIG. 3 is a view similar to FIG. 2 but with the gage roll head approaching its highest position; and,

FIG. 4 is a view similar to FIGS. 2 and 3 but illustrating the adjustment of the gage roll during a splitting operation.

As best seen in FIGS. 2 to 4, the work piece 1 to be split is fed along a supporting table 2 and between a gage roll 3 and a ring roll 4 toward the cutting edge of a belt knife 5 which extends across the width of the machine. The gage roll 3 is adapted to be rigidly held in a predetermined position above the cutting plane of the belt knife and acts to determine the thickness of the material after it is split. The ring roll 4 is mounted in the usual fashion for yielding movement so as to maintain the work piece firmly against the gage roll while being free to accommodate varying thickness of the work piece.

The gage roll 3 is mounted at opposite ends for rotation in suitable bearings carried by a gage beam 6. The gage beam is provided with end plates 7 which are fulcrumed on pins 8 mounted in side frames 9 of the machine. The extent of movement of the head is limited by studs 10 which extend inwardly from the side frames into arcuate slots 11 in the end plates 7. For raising and lowering the gage roll as well as for fixing the position of the roll with respect to the cutting plane of the belt knife, the end plates 7 are connected by rods 12 to double acting pistons 13 mounted in cylinders 14 fulcrumed by pins 15 on the side frames 9.

The left side of each piston as seen in FIGS. 2–4 is known as the pulling side since pressure fluid in the chamber 16 of the cylinder acts on this side of the piston to pull the gage roll 3 away from the knife 5. The chamber 16 is connected by a pipe 18 to a conduit P which supplies fluid under pressure from a pump not shown. Thus, there is a continuous supply of pressure fluid in the chamber 16 acting on the piston 13 to urge the gage roll constantly away from the knife. The right side of each piston is known as the pressure side since pressure fluid in the chamber 20 acts against that side of the piston to move the gage roll toward the knife or to act as an abutment to maintain the roll rigidly against the pressure of the work piece against the roll. It should be obvious that due to the presence of the rod 12 the pulling side of the piston has a smaller effective area against which the pressure fluid may react. Thus, the pressure side of the piston is capable of exerting a force for moving the roll toward the knife against the force exerted by the pulling side.

From the foregoing it may be seen that by controlling the flow of pressure fluid to and from the chambers 20 of the cylinders the adjusting movement of the gage roll is also controlled. To this end the chambers 20 of both cylinders are connected by pipes 22 to a port 24 of a feeler valve 26. For purposes of clarity, however, only one pipe 22 is shown in the drawings. This valve is fixed to one of the end plates 7 to move with the roll and is provided with an inlet port 28 connected by a pipe 30 to the pressure conduit P, the valve also being provided with an exhaust port 32. A valve element 34 having a spool 36 controls the passage of fluid through these ports. The element is urged to the right, as seen in FIG. 2, by a spring 38 until a stem 40 extending from the element through the valve body engages the end of a spindle 42. As seen in FIG. 2, the spool 36 blocks the port 24 so that the pressure fluid in the chamber 20 is locked therein forming a firm abutment against which the piston 13 is held by the pressure fluid in the chamber 16. In this manner the gage roll 3 is rigidly held in position to gage the thickness of the work being split.

The spindle 42 is threaded through a sleeve 44 which is mounted for sliding movement in a cylinder 46 fixed to one of the end frames 9. The sleeve is fixed against rotation by a key and is normally held against the left end of the cylinder by a rather heavy spring 48 which is retained in the cylinder by an adjustable end cap 50. For adjustment, the spindle is provided with a hand wheel

52 and is locked with respect to the sleeve 44 by a lock nut 54.

Adjustment of the spindle to the left moves the valve element 34 against the action of the spring 38, opening the port 24 to communicate with the inlet port 28 so that pressure fluid flows through the valve to the pressure chamber 20. The force thus exerted against the pressure side of the piston 12 overcomes the force on the pulling side and the gage roll is moved toward the belt knife 5. As the gage roll descends, the feeler valve 26 moves away from the spindle 42 although the feeler stem 40 remains in contact with the spindle through the force of the spring 38. This causes the element to reassume its initial position in the valve 26 so that the spool 36 once again closes the port 24 leading to the pipe 22. The gage roll head at this time is once again stopped with the fluid locked in the chamber 20 maintaining the gage roll rigidly in its new position. Thus, fluid at the pressure side of the piston once again acts as a firm abutment against working pressure on the gage roll. The pulling sides of the pistons, as stated previously, are maintained under pressure holding the pistons against the fluid locked in the chambers 20.

By adjusting the spindle 42 to the right, the valve element 34 also is moved to the right by the spring 38 once again uncovering the port 24 but this time permitting communication through the valve from the chamber 20 to the exhaust port 32. At this time the pressure in the chamber 20 is exhausted and the force acting on the pulling side of the pistons moves the gage roll upwardly away from the knife until movement of the valve 26 relative to the spindle once again causes the valve element 34 to return to its initial position closing off the port 24 stopping movement of the roll.

So that the gage roll may be raised a predetermined amount during the splitting operation at the will of the operator, the cylinder 46 is connected by a pipe 60 to a valve 62. As seen in FIG. 2, this valve is provided with a manually operated element 63 which is normally spring urged to a position which places the pipe 60 in communication with an exhaust port 64. However, manual depression of the element 63 to the position seen in FIG. 4 closes the exhaust port and places the pipe 60 and cylinder 46 in communication with a pipe 66 leading to the pressure conduit P. In this manner pressure fluid flows into the cylinder 46 and acts on an enlarged portion of the sleeve 44 to move the sleeve to the right against the action of the spring 48 until the sleeve contacts the end cap 50. It should be obvious that the extent of movement of the sleeve may be varied by adjusting the end cap.

Movement of the sleeve 44 at this time retracts the spindle 42 bodily to the right causing the valve element 34 in the feeler valve 26 to move to the right permitting fluid to be exhausted from the pressure chamber 20 of the cylinders and also causing the gage roll to be raised a predetermined amount until the valve element 34 once again blocks off the pressure chamber. When the operator releases the element 63 fluid is exhausted from the cylinder 46, returning the spindle 42 to its initial position whereupon the gage roll is also returned to its initial position. By adjusting the spindle 42 to the position seen in FIG. 3, it may be seen that the gage roll is retracted to its uppermost position to permit the gage roll to be removed or the machine to be serviced easily without interference from the roll.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a machine for splitting sheet material having a knife and a gage roll spaced from said knife for controlling the thickness of the split material; mechanism for positioning the gage roll comprising a double acting fluid motor having one portion connected to a source of pressure fluid for exerting a constant force tending to move said roll away from said knife and having another portion adapted to exert a greater force tending to move the roll toward said knife, a feeler valve connected to said other motor portion and mounted for movement with said roll, an element in said valve normally in a position locking pressure fluid in said other motor portion forming a firm abutment against which said one portion acts to maintain said roll in a predetermined position, said element being movable from said position in one direction for directing pressure fluid from said source to said other motor portion for moving said roll toward the knife against the action of said one motor portion, said element also being movable in the opposite direction for directing pressure fluid from said other motor portion to an exhaust port permitting said one motor portion to retract the roll away from the knife, a stop fixed against movement with the valve and roll and normally holding the element in said locking position, and means for adjusting said stop for varying the position of the roll by moving said element in said valve to cause the motor to move the roll until relative movement between the valve and element returns the element to its locking position.

2. In a machine for splitting sheet material having a knife and a gage roll spaced from said knife for controlling the thickness of the split material; mechanism for positioning the gage roll comprising a double acting fluid motor having one portion connected to a source of pressure fluid for exerting a constant force tending to move said roll away from said knife and having another portion adapted to exert a greater force tending to move the roll toward said knife, a feeler valve connected to said other motor portion and mounted for movement with said roll, an element in said valve normally in a position locking pressure fluid in said other motor portion forming a firm abutment against which said one portion acts to maintain said roll in a predetermined position, said element being movable from said position in one direction for directing pressure fluid from said source to said other motor portion for moving said roll toward the knife against the action of said one motor portion, said element also being movable in the opposite direction for directing pressure fluid from said other motor portion to an exhaust port permitting said one motor portion to retract the roll away from the knife, a stop fixed against movement with the valve and roll and normally holding the element in said locking position, means for adjusting said stop for varying the position of the roll by moving said element in said valve to cause the motor to move the roll until relative movement between the valve and element returns the element to its locking position, and manually controlled means for moving said stop from its adjusted position independently of said adjusting means for causing a predetermined movement of the roll during operation of said machine, said control means also being effective at the will of the operator to return said stop to its adjusted position thereby also causing said roll to be returned to its initial position.

3. In a machine for splitting sheet material having a knife and a gage roll spaced from said knife for controlling the thickness of the split material; mechanism for positioning the gage roll comprising a double acting fluid motor having one portion connected to a source of pressure fluid for exerting a constant force tending to move said roll away from said knife and having another portion adapted to exert a greater force tending to move the roll toward said knife, a feeler valve connected to said other motor portion and mounted for movement with said roll, an element in said valve normally in a position locking pressure fluid in said other motor portion forming a firm abutment against which said one portion acts to maintain said roll in a predetermined position, said element being movable from said position in one direction for directing pressure fluid from said source to said other motor portion for moving said roll toward the knife against the action of said one motor portion, said element also being movable in the opposite direction for directing pressure fluid from

said other motor portion to an exhaust port permitting said one motor portion to retract the roll away from the knife, a cylinder fixed against movement and having a piston biased against one end, a spindle adjustably mounted in said piston and extending from the cylinder forming a stop which normally holds said valve element in said locking position, means for adjusting said spindle relative to the piston for varying the position of the roll by moving the element in said valve to cause said motor to move the roll until relative movement between the valve and element returns the element to said locking position stopping movement of the roll, and a manually actuated valve for for directing pressure fluid into said cylinder for moving the piston and spindle bodily to a predeterminable position to cause the position of said roll to be varied during a splitting operation of the machine, said actuated valve also being effective at the will of the operator to exhaust fluid from the cylinder for returning the piston and spindle for causing the roll to be returned to its initial position.

No references cited.