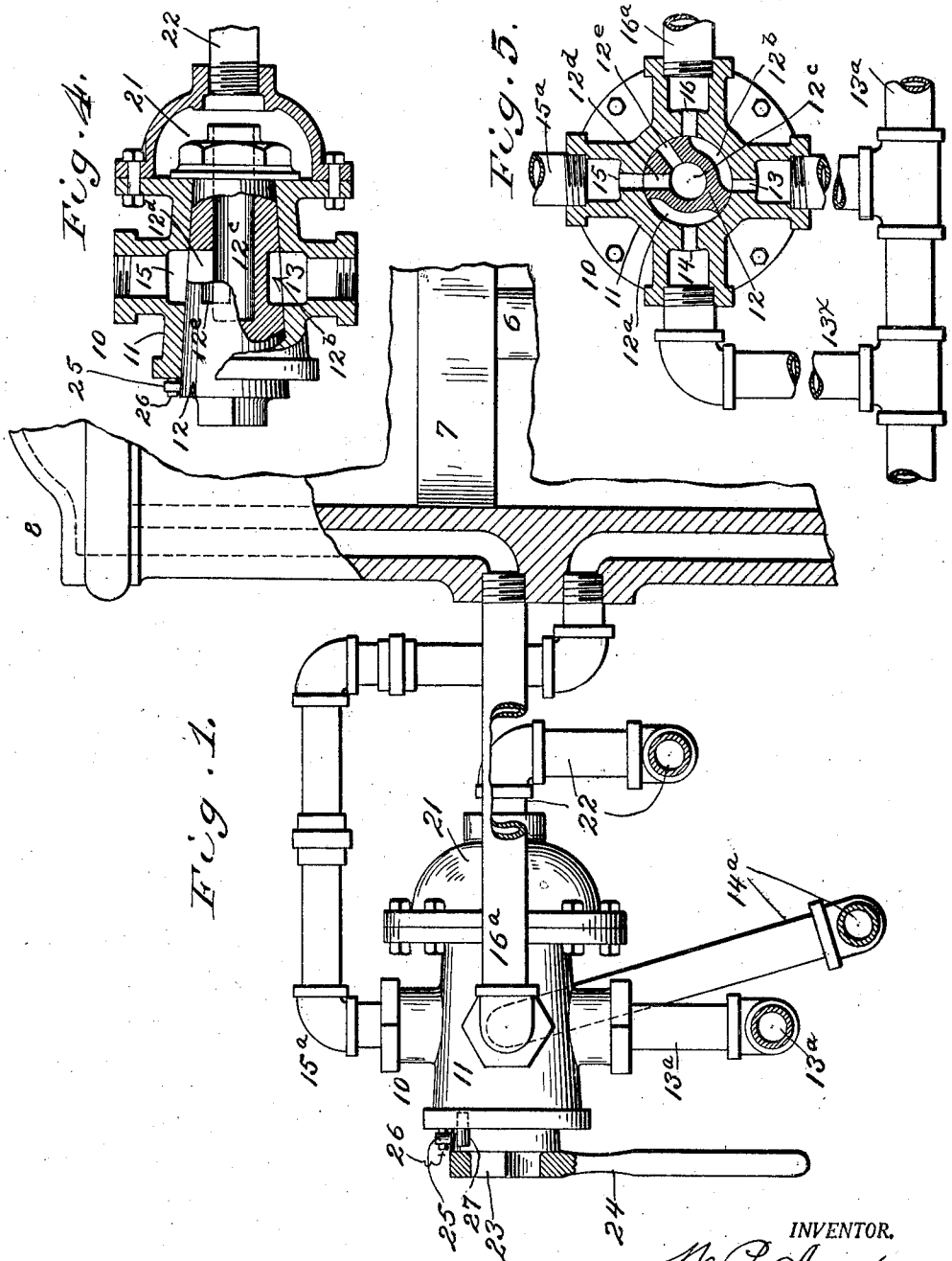
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W. P. ARGY

VALVE MECHANISM

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INVENTOR.
W. P. Argy
BY
Rogers, Kennedy & Campbell
ATTORNEYS

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Fig. 3

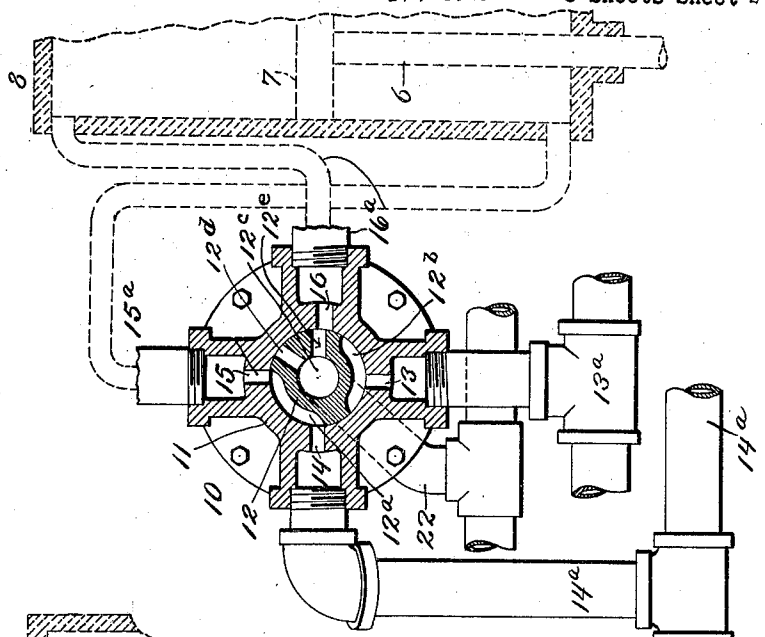
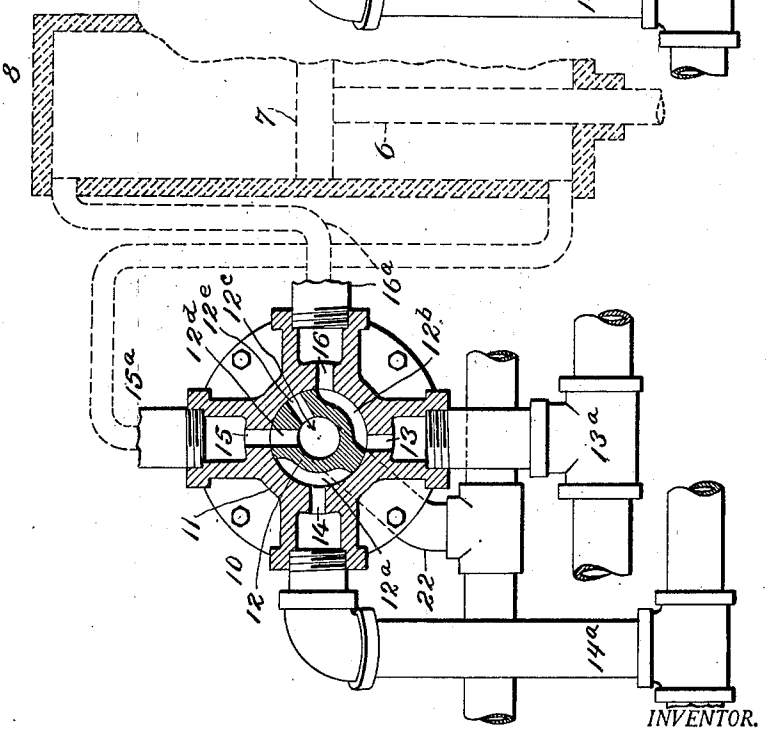


Fig. 2.



INVENTOR.

W. P. Argy

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

Sept. 30, 1924.

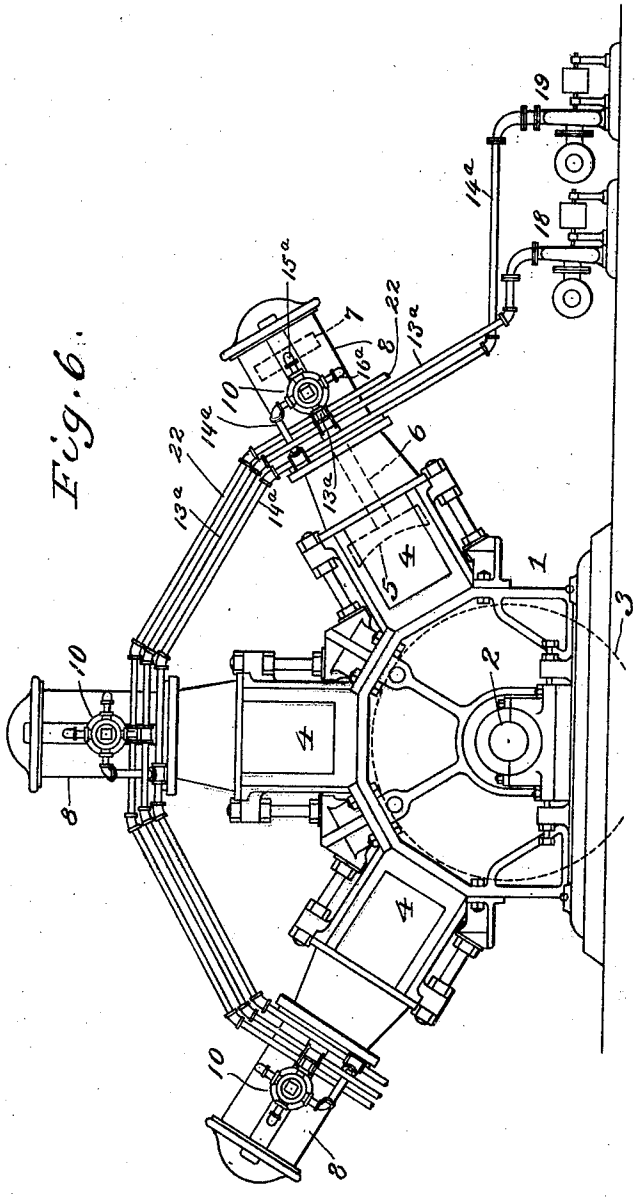
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W. P. ARGY

VALVE MECHANISM

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Fig. 6.



INVENTOR.

W. P. Argy

BY

Rogers, Kennedy & Campbell

ATTORNEYS.

Patented Sept. 30, 1924. 1,510,129

UNITED STATES PATENT OFFICE.

WILLIAM P. ARGY, OF TURNERS FALLS, MASSACHUSETTS, ASSIGNOR TO INTERNATIONAL PAPER COMPANY, A CORPORATION OF NEW YORK.

VALVE MECHANISM.

Application filed March 17, 1921. Serial No. 453,073.

To all whom it may concern:

Be it known that I, WILLIAM P. ARGY, a citizen of the United States, residing at Turners Falls, in the county of Franklin and State of Massachusetts, have invented certain new and useful Improvements in Valve Mechanism, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a valve mechanism for use more particularly in connection with wood grinding machines designed for the production of wood pulp used in the manufacture of paper, such machines embodying usually a grinder in the form of a rotary grind stone, against which the chunks or billets of wood held in pockets in a suitable housing or frame, are forced by a pressure shoe or head on a power piston working in a power cylinder and actuated by fluid pressure. In the operation of such machines, the fluid pressure admitted to the outer end of the cylinder forces the piston towards the stone and presses the wood thereagainst with grinding pressure, and when all the wood in the pocket has been ground, the piston is retracted in order to permit the pocket to be refilled, by admitting the fluid pressure to the inner end of the cylinder with the result that the pressure shoe will be backed off or moved outwardly in the empty pocket, it being understood that in these operations when the pressure fluid is admitted to one end of the cylinder, the other end is opened to the exhaust. Also in the operation of such machines, the actuating pressure fluid is supplied from a suitable source usually by a pump, and is piped to a valve mechanism connected with the single cylinder when a single pocket is employed, or connected to the valve mechanisms for the several cylinders, when a number of pockets are employed. In some cases the pressure fluid is taken from a single source of supply and in other cases from two independent sources, a high pressure admitted to the outer end of the cylinder to apply grinding pressure to the piston, and a low pressure admitted to the inner end of the cylinder to apply the "backing off pressure," the use of such two pressures thereby avoiding the reduction of the pressure in the system and the consequent racing of the stone which would ensue where a single source of pressure employed both for applying grinding pressure and backing off pressure to the pistons.

The present invention is concerned with the form and construction of a valve mechanism for controlling the admission of the pressure fluid to the power cylinder or cylinders, and the invention consists of a valve mechanism of improved form and construction, designed more particularly for the control of the actuating pressure fluid from two independent sources of supply, but adaptable also to the control of the pressure fluid when taken from a single source, the details of which valve mechanism will be fully set forth in the description to follow, and the novel features of which will be pointed out in the appended claims.

In the accompanying drawings I have illustrated my improved valve mechanism applied to a grinding machine in which three pockets are provided for holding the wood to be ground, one of my improved valve mechanisms being applied to each power cylinder and the said mechanism being connected together by appropriate piping in the general system and adapted to be operated independently to control the admission of the pressure fluid independently to the respective cylinders, but it will be understood that the invention is not limited to such use and is applicable as well in connection with grinding machines employing a single wood holding pocket and a single power cylinder and piston to act on the wood.

In the accompanying drawings:

Fig. 1 is a side elevation on an enlarged scale of the improved valve mechanism and the adjacent portion of the power cylinder with which it is associated, certain parts being broken away, and other parts being in section to better show the construction.

Fig. 2 is a cross section of the valve mechanism on the line A—A of Fig. 1.

Fig. 3 is a view similar to Fig. 2 with the valve in a different position.

Fig. 4 is a longitudinal sectional elevation on the line B—B of Fig. 2.

Fig. 5 is a view similar to Fig. 2 but showing the connection of the pressure fluid supply pipe with the valve casing when a single source of pressure fluid is employed.

Fig. 6 is a front elevation of a wood grinding machine having my invention embodied therein.

Referring to the drawings:

1 designates a frame or housing in which is mounted a rotary power shaft 2 having fixed to it a grindstone 3. Fixedly sustained by the housing is a number of pockets 4 in the present instance three for holding the work to be ground, and in each pocket is arranged a pressure device or shoe 5 to act on the wood and force it against the grindstone. Each pressure shoe is connected with the lower or inner end of a piston rod 6 which in turn is connected with a piston 7 sliding in a power cylinder 8 fixed to and extending outwardly from the upper end of the pocket, it being understood that there is a power piston and cylinder for each pocket. On the admission of the pressure fluid, usually water, to the outer ends of the cylinders, the pistons will be caused to move inwardly and the pressure shoes will force the wood against the stone and thereby effect the grinding operation, and on the admission of the pressure fluid to the opposite ends of the cylinders, the pistons will be retracted and will move the pressure shoes away from the stone, this latter action being effected when all the wood in a pocket has been ground and the pocket is to be refilled.

My improved valve mechanism is designated by the numeral 10 and one is shown applied to each power cylinder, and as these mechanisms are the same for the several cylinders, a detailed description of one will suffice.

As shown more particularly in Figs. 2, 3, 4 and 5 the valve mechanism comprises a valve casing 11 and a rotary oscillating valve 12 mounted therein. The casing is of elongated slightly tapering cylindrical form and is provided with four ports or openings extending through the wall thereof and spaced equal distances apart therearound, an inlet port 13, a second inlet port 14, a discharge port 15 and a second discharge port 16. The discharge port 15 has connected with it a pipe 15^a which leads to the inner end of the power cylinder, and the discharge port 16 has connected with it a pipe 16^a which leads to the outer end of the power cylinder, whereby the pressure fluid is supplied respectively to the opposite ends of the cylinder as will be more particularly described hereinafter. The inlet port 13 is connected by a pipe 13^a to a source of pressure fluid supply, in the present instance from a high pressure pump 18 as shown in Fig. 1, and the inlet port 14 is connected by a pipe 14^a to a second source of fluid pressure supply, in the present instance from a low pressure pump 19, the valve 12 now to be described, being so formed that the high pressure fluid can be admitted to the outer end of the cylinder to apply grinding pressure to the piston, and the low pressure fluid can be admitted to the inner end of the cylinder to apply "backing off" pressure to the piston.

The valve 12 is of general cylindrical tapering form to fit and turn in the valve casing and is provided with oppositely disposed side supply ports 12^a and 12^b, a central axial exhaust port 12^c, and two radial passages 12^d and 12^e which lead outwardly from the exhaust port through the side of the valve, these several ports being positioned in the valve so that certain of them will register with certain of the ports in the valve casing in the different positions of the valve. For instance, the side supply port 12^b, when the valve is in the position shown in Fig. 3, will register with and connect the inlet port 13 and the cylinder port 16 of the valve casing, and the passage 12^d in the valve will register with the cylinder port 15 of the valve casing and will thus connect said cylinder port with the exhaust port 12^c; and when the valve is moved to the position shown in Fig. 4, its other side supply port 12^a will register with and connect inlet port 14 and cylinder port 15 of the valve casing, and the passage 12^e in the valve will register with cylinder port 16 and thus connect said port with the exhaust port 12^c.

The first position of the valve, that shown in Fig. 3, is resorted to when the high pressure fluid is to be admitted to the outer end of the cylinder to apply grinding pressure to the piston and the shoe carried thereby, and when the valve is so set, the high pressure fluid from the supply pipe 13^a will flow through inlet port 13, side supply port 12^b, cylinder port 16, pipe 16^a and will enter the outer end of the cylinder, while the pressure fluid from the opposite side of the piston will exhaust through passage 12^d and exhaust port 12^c, the low pressure fluid in this position of the valve being cut off by the non-registering relation of the supply port 12^a with cylinder port 15. The piston therefore will be forced inwardly and the pressure shoe will be caused to force the wood against the grindstone with grinding pressure. When now the valve is moved to its other position as shown in Fig. 4, the high pressure fluid will be cut off by the non-registering relation of the supply port 12^b in the valve with the cylinder port 16 of the valve casing, and the low pressure fluid will flow from supply pipe 14^a through inlet port 14 in the valve casing, supply port 12^a in the valve, cylinder port 15 in the valve casing, pipe 15^a and will enter the inner end of the cylinder, and the outer end of the cylinder will be connected with the exhaust port by passage 12^e registering with cylinder port 16. As a result, the piston will be

subjected to "backing off" pressure and will move outwardly in the cylinder and carry the pressure shoe away from the stone.

The exhaust port 12^c leads axially through the end of the valve and connects constantly with a chamber 21 in the end of the valve casing, which chamber is formed with an opening 21^a constituting an exhaust port which has connected with it a pipe 22 by which the exhaust fluid is carried away. The opposite end of the valve is extended outwardly through the opposite end of the valve casing and its exposed extremity is provided with a squared head 23 for the application of a turning wrench or handle 24.

The projecting end of the valve has fixed to it a radial pin 25 which in the oscillating or rocking movements of the valve, moves between two stop lugs 26 and 27 on the valve casing, which lugs thus determine the two positions of the valve as described, the valve being in the position of Fig. 3 when the pin is in contact with the lug 26, and being in the position of Fig. 4 when the pin is engaged with lug 27.

In the foregoing description I have set forth my improved valve mechanism employed to control independent pressure fluid mediums from independent sources, the two supply pipes being connected respectively with the two inlet ports of the valve casing, with the high pressure fluid from one source acting to apply grinding pressure to the piston, and the low pressure fluid from the other source acting to apply backing off pressure to the piston. But the valve mechanism may be employed in cases where a single pressure fluid is used for both the grinding pressure and backing off pressure, the only change necessary being in the piping conducting the pressure fluid to the valve casing as shown in Fig. 6, where it will be seen that the supply pipe for the single pressure fluid entering the inlet port 13 of the valve casing is branched at 13^x and the branch connected with the other inlet port 14. In the position of the valve shown in Fig. 6, the pressure fluid will enter the outer end of the cylinder through ports 13, 12^b and 16 and the inner end of the cylinder will be placed in communication with the exhaust by ports 15, and passage 12^d; and when the valve is moved to its other position, the pressure fluid will flow to the inner end of the cylinder through branch pipe 13^x, and ports 12^a and 15, and the outer end of the cylinder will be opened to the exhaust by port 16 and passage 12^e. When the valve mechanism is thus used to control the pressure fluid from a single source, it is preferable to employ a pipe of reduced diameter in the branch connection 13^x leading from the supply pipe to the inlet port 14 for the backing off pressure, as the effect of such reduced area for the passage of the pressure fluid will be to back up to some extent the pressure on the pump and the other cylinders, where a number of pockets are employed, and this will tend to prevent racing of the stone and will cause more rapid grinding in the other pockets.

From the foregoing description it will be understood, that my improved valve is of unitary form and of extreme simplicity and effectiveness in controlling the two pressure fluids from independent sources. It affords unobstructed openings for the free inlet and discharge of the water and avoids any clogging up with refuse collected by the pumps or cylinders. It insures a quick and prompt change from high to low pressure, and thereby increases the pressure on the cylinders remaining in action, when the piston of one is backed off and thus reduces the tendency of the stone to race; and it may be employed without inherent change, to control a single pressure fluid as well as two pressure fluids.

While in the foregoing description and accompanying drawings I have set forth my invention in the particular detailed form which I prefer to adopt, it will be understood that these details may be changed and modified by the skilled mechanic without departing from the limits of my invention; and it will be further understood that the invention is not limited to any particular form or construction of the parts except in so far as such limitations are set forth in the claims.

Having thus described my invention, what I claim is:

1. A valve mechanism comprising a valve casing provided bettween its ends with a plurality of side ports, and provided in its end with an exhaust port, and a valve oscillatable in the casing and provided with two side ports, adapted in the different positions of the valve, to cooperate with certain of the side ports of the casing, and provided also with an axially extending exhaust port leading from a point between the ends of the valve outwardly through the end thereof and communicating constantly with the exhaust port of the casing, said axially extending port adapted, in the different positions of the valve, to connect at its inner end alternately with certain of said side ports of the casing.

2. A valve mechanism comprising a valve casing provided between its ends with a plurality of side ports, and provided in one end with an exhaust port, and a valve oscillatable in the casing and provided with two side ports, adapted in the different positions of the valve, to cooperate with certain of the side ports of the casing, and provided also with an axially extending exhaust port leading from a point between the ends of the valve outwardly through the end thereof and

communicating constantly with the end exhaust port of the casing, said axial exhaust port extending at its inner end radially through the valve and adapted, in the different positions of the same, to connect with certain of the side ports of the casing.

3. A valve mechanism comprising a valve casing provided between its ends with a plurality of side ports, and provided at one end with a chamber having an exhaust port, and a valve oscillatable in the casing and provided with two side ports, adapted in the different positions of the valve, to cooperate with certain of the side ports of the casing, and provided also with an axially extending exhaust port leading from a point between the ends of the valve outwardly through the end thereof and communicating constantly with the end chamber of the valve casing, said axially extending port adapted, in the different positions of the valve, to connect alternately with certain of the side ports of the casing.

4. A valve mechanism comprising a valve casing provided between its ends with a plurality of side ports, and provided at one end with an exhaust port, and a valve oscillatable in the casing and provided with two side ports, adapted in the different positions of the valve, to cooperate with certain of the side ports of the casing, and provided also with an axially extending exhaust port leading from a point between the ends of the valve outwardly through the end thereof and communicating constantly with the exhaust port of the casing, the said axially extending exhaust port being provided at its inner end with two radial ports leading outwardly through the side of the valve and adapted, in the different positions of the same, to connect alternately with two adjacent side ports of the casing.

5. A valve mechanism comprising a valve casing provided between its ends with two side ports and with two discharge ports, and provided in one end with an exhaust port, a valve oscillatable in the casing and formed with two side ports and with an axially extending exhaust port, the relation of said ports in the valve casing and valve being such that when the valve is in one position, one of its side ports will connect two adjacent side ports of the casing with each other, and the axial port will communicate with another of the side ports of the casing and with the exhaust port thereof, and when the valve is in another position, its other side port will communicate with the other two adjacent side ports of the casing, and the axial port will connect one of the two first mentioned side ports of the casing with the exhaust port of the same.

In testimony whereof, I have affixed my signature hereto.

WILLIAM P. ARGY.